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Editorial.

THE STUDY OF TROPICAL VETERINARY DISEASES: A GREAT ADVANCE.

On another page will be found the prospectus of the Department of Tropical Veterinary Medicine of the Liverpool Institute of Comparative Pathology. This department has just been opened and promises to become a very important branch of veterinary medicine. It is an extension of the Liverpool scheme for the study of tropical diseases, and owes its initiation to the enterprise and patriotic zeal of the inhabitants of that city. We acclaim its birth with great satisfaction, and feel certain that, whether surveyed from the patriotic or the scientific point of view, it is destined to be of enormous benefit to this country. If any of the great nationalities ought to feel interest in things tropical, that nationality is the British. Our dominions extend so far into and through the tropics, and contain such an enormous number of individuals, that in sheer defence we are bound to study the causes of the diseases which occur there, and endeavour to find means for their successful treatment, with a view to their eventual extirpation.

It will be noticed that one of the objects of the school is to organise expeditions. This is excellent, and if the expeditions are well-manned and well-equipped with the necessary apparatus and an adequate supply of necessaries, the results may be of immensely greater value than we even dream of at present. The primary necessity is adequate funds, but we have no doubt the energetic and far-seeing citizens of Liverpool and other places will not stint these. To a great shipping port it is of vital importance that trade with foreign countries should be as little hampered by disease as possible. Healthy flocks and herds mean healthy populations and free and constant interchange of products, and all this means business and wealth and comfort to the merchants and shipowners, and through them to the other inhabitants of Liverpool, and if Liverpool prospers England prospers. But mere wealth is not sufficient for a successful campaign against disease. The personal equation must also be taken into account. Men require to be properly trained in order to avail themselves to the utmost of their

opportunities of observation. It may be said in a general way that all diseases are variants of an initial disorder. There is fever, there is inflammation, there is the flagging appetite, the general lassitude, and all the other symptoms and indications of a disturbance of nature's balance, the intrusion of some foreign and incongruous element. Therefore only those who know the conditions of health can appreciate the force and significance of the disturbance. But the combination of the disturbing elements varies infinitely, and therefore even the specialist must be constantly on the alert. Gradually, however, he finds that types or categories of disease occur, and he recognises them at once, and hastens to check their ravages. Herein lies the importance of expeditions into the enemy's territory, led by able and properly qualified men, who have met similar enemies elsewhere, and understand what hostility means, and what is the best mode of attack. To illustrate what we mean we will take a disease like *mal de caderas*. An English veterinarian reads all the treatises which have been written on the subject, examines all the drawings which have been prepared, makes perhaps a microscopic observation of sections sent him from abroad. He mentally catalogues the disease, and puts it away in one of the drawers of his memory. He has perhaps the scientific imagination, and forms a mental picture of the patient suffering from this disease, but he has never seen it with the eye of the flesh, and is therefore at an enormous disadvantage as compared with the man who has so seen it. The untravelled Englishman *might* diagnose the disease at once if he saw a case, might even teach a pupil how to diagnose it, but the chances are that he would either fail altogether or take such a long time that the opportunity of combating it had passed. Let us suppose the disease has ten symptoms, all of which the untravelled Englishman knows and can repeat, but he does not know that, let us say, number nine is at once the subtlest, the most innocent-looking, and yet the most characteristic. The Englishman who has formed part of an expedition, and has studied the disease in its habitat, has learnt to look out for number nine and "spots" it at once, however disguised; he is therefore miles ahead of his stay-at-home colleague.

We are glad to see that a post has been found for Major Ross, to whom the country is so deeply indebted for his researches in connection with malaria. To have the benefit of his vast experience is to go a long way towards securing the success of the department.

We give on another page a translation of a speech by the late Professor Nocard at the Conference of Tropical Medicine, which our readers will peruse with interest, both on account of its intrinsic merit, and because it was perhaps M. Nocard's last public utterance.

Original Papers.

SPEECH DELIVERED BY THE LATE PROFESSOR E. NOCARD AT THE CONFERENCE OF TROPICAL MEDICINE, HELD IN LIVERPOOL 11TH MAY 1903.

GENTLEMEN,—What has most struck me during my stay in Liverpool is the intimate association which has been established here between commerce and science—an association pregnant with benefits for civilisation and the whole of humanity. With us in France, business men, far from encouraging hygienists, consider them as obstructives if not as enemies, and we see farmers every now and then making hostile demonstrations against those who are entrusted with the duty of putting in force sanitary regulations which yet have for their sole object the protection of agricultural interests. You, gentlemen, the merchants of Liverpool, have recognised that the most precious of all goods is human life, and that scientific men and hygienists are the most important of your helpers. All honour to you, and may your example be followed on the other side of the channel! A great deal has been said during the last three days about the beauty of the work you have accomplished: will you permit me to point out a gap which you have left, but which you will have no difficulty in filling up? Your school of tropical medicine is very well fitted for supplying your colonies with excellent doctors, but it seems to me you have not thought of providing good veterinary surgeons for them. Yet, I assure you, it is worth while. In all new countries, and these are always the most profitable for bold and enterprising merchants like you, the means of communication are always more than rudimentary; wheeled vehicles are unknown; the only means of transport are beasts of burden, and where these do not exist there remains only man, and you know better than I the enormous cost of transport on men's shoulders.

Your Livingstone has said somewhere that the tsetse was the greatest obstacle to the penetration of civilisation into Central Africa, the reason being that all beasts of burden are liable to the *nagana*, which is inoculated into them by the stings of the tsetse. Thus the tsetse has wrecked lamentably so many admirably equipped expeditions! The scientific study of animal diseases is therefore quite as necessary as that of human diseases if we are to help forward civilisation, with which the prosperity of commerce is so closely connected. Permit me to relate a recent occurrence which has a special significance for England, and which will prove to you in a striking way the correctness of my contention. In normal times the planters of Mauritius go to Madagascar for their supplies of the cattle they require for the cultivation of the land and the transport of their harvests. But it happened during the South African war that England required for the feeding of her army almost all the cattle to be obtained in Madagascar. The people of Mauritius not being able to compete against the mother-country, had therefore to go elsewhere, and some of them thought that it would be a good plan to introduce cattle from India, which could be had very cheap. In September 1901 a vessel loaded with Indian bullocks arrived at Port Louis, and was put into quarantine because a certain number of bullocks had died during the voyage, and some were still sick.

The veterinary surgeons who were in charge of the local sanitary service examined the sick animals over and over again; they made post-

mortems of those which had succumbed, yet they could not arrive at the nature of the disease. After a time, the mortality having ceased and the animals which had been sick seeming to have recovered, the embargo was raised and the remainder of the cargo was handed over to the importers to do as they liked. What happened? Wherever the chances of sale had scattered the survivors, their companions in the cattle-sheds were seen to fall ill and die with symptoms and lesions identical with those observed during the voyage or in quarantine. Nay, more, the disease did not confine itself to the cattle, but attacked also, and with greater violence, the horses and mules of the island; in fact, it spread so rapidly and in every direction through Mauritius, that the planters in dismay began to wonder how they were going to gather in their crops of sugar-cane.

The disease was one whose nature has for a long time been misunderstood. It was only in April 1902 that a medical man, Dr. Lesur, examining microscopically the blood of affected animals belonging to a friend of his, noticed the presence of numerous filiform parasites, extremely mobile, which he was able quite easily to connect with the trypanosoma of the *nagana* of South Africa or the *surra* of India. M. Laveran and myself confirmed the diagnosis after studying numerous slides of blood sent from Mauritius. Now, you know that the *nagana* is propagated by the tsetse, which draws from the skin of sick animals blood charged with parasites and deposits them by means of its sting in the skin of healthy animals. But the tsetse does not exist in British India; it is another sucking insect, the *tabanus tropicus*, which appears to play the same part there. In Mauritius neither the tsetse nor the *tabanus tropicus* is known, but there exist a great number of stinging flies which torment animals at work, and of these there is one, the *stomoxys nigra*, which would appear to be the principal agent in the propagation of the disease.

Hitherto we have not been able to discover any means of treating successfully either *nagana* or *surra;* the only sure means of avoiding the ravages of the disease is therefore to prohibit the importation of diseased animals. If the authorities at Mauritius had ordered all the survivors of the infected cargo to be slaughtered on arrival, the island would have escaped the frightful epizootic which threatens the ruin of its agricultural industries. Unfortunately, the agents of the sanitary service had had insufficient technical instruction; they had never seen *surra*, they did not know by what simple means it can be recognised even in animals which present no apparent symptom. When at last the disease was recognised, it was too late to stop its spread—the whole island was already infected. Now, suppose the people of Mauritius had got into the habit of sending their veterinary surgeons every two or three years to make a stay of a few weeks in a school like yours, to refresh their knowledge at its sources and acquaint themselves with the progress of science, there is no doubt they would have succeeded in detecting the existence of *surra* on the suspected bullocks, and so would have saved the island from the present epizootic, which constitutes a veritable disaster.

By this example, you Liverpool gentlemen will, I am sure, perceive that your School of Tropical Medicine, which has already done such good service, must not content itself with equipping colonial physicians, but must open its doors to veterinary surgeons who intend to enter the colonial service. You may be perfectly sure that the additional expense will be repaid a hundredfold.

THE NATIONAL IMPORTANCE OF A STUDY OF TROPICAL VETERINARY MEDICINE.

In 1898 Mr. Chamberlain drew attention to the necessity of the study of tropical medicine, and as the result of his appeal two large schools were founded in London and Liverpool respectively.

Both have succeeded beyond expectation in directing attention to the study of tropical diseases; expeditions have been sent out by them to all parts of the world; they have discovered new diseases, investigated the means of prevention of tropical diseases, and have trained very numerous medical men and others for the tropics. Their teaching has been taken advantage of by students of all nations, and the practical measures of prevention which they have advocated have already brought about great improvement in the health of numerous tropical towns, and has diminished the mortality.

Encouraged by this success and by the remarkable speech of the late Professor Nocard, of Paris, delivered to the School of Tropical Medicine in Liverpool a few weeks before his death, and in which he emphasized the great national want of systematic training and research in tropical veterinary medicine, the time appears an opportune one in which to commence work in this direction. The animal industries are of great national importance, and progress in tropical countries is kept back by sickness and mortality amongst cattle and animals of transport. The advantages which Liverpool possesses for the study of tropical medicine are equally applicable to tropical veterinary medicine. There is an immense foreign cattle trade with the port of Liverpool. An institute for the study of comparative pathology has been recently founded, and a farm station acquired where experiments in the production of vaccines and sera are now actively conducted.

The Johnston Laboratory of the University of Liverpool, opened in May of this year by Mr. Walter Long, contains the fully equipped laboratories of the Institute of Comparative Pathology, of the Tropical School, of Bio-Chemistry, and of the Cancer Research Committee, and is directly connected with the departments of bacteriology, pathology, and physiology. These various subjects closely associated together in the new Thompson Yates and Johnston Laboratories mutually help one another, and thus increase the thoroughness of the training and very greatly promote the opportunities for research.

PROSPECTUS OF COURSES.

The objects of the Tropical Veterinary Department of the Institute are:—

1. To train veterinary and medical men in the special subject of Tropical Diseases of Animals.
2. To afford facilities for research in these diseases and to organise expeditions for this purpose.
3. To organise preventive measures in the tropics against diseases of animals.

COURSE OF INSTRUCTION.

1. Lectures and clinical instruction in the diseases of animals in the Tropics—

Bacterial Diseases.—Anthrax, black quarter, tuberculosis, glanders, actinomycosis, tetanus, spirillum fever, the pasteurella, strangles, &c.
Diseases—cause unknown.—Rabies, cowpox, horsepox, horse sickness, rinderpest, foot and mouth disease, &c.
Blood Parasite Diseases:—

Trypanosomiasis.—Surra, nagana, dourine, mal de cadera, &c.
Pirosomiasis.—Texas cattle fever and redwater fever of cattle, also of horse, sheep, and dog.

Other Parasitic Diseases.—Coccidial diseases of animals—filariasis and other helminthiases; skin parasites.

II. Laboratory instruction—

Technique and methods of examination of blood—secretions, excretions, &c.
Life history of parasitic worms and insects.
Bacteriological methods.
Method of immunisation against disease.
Testing of products for the prevention and cure of animal diseases.

The laboratories occupy one floor of the newly erected Johnston laboratories, and are in close association with those of the Liverpool School of Tropical Medicine. Suitable accommodation for animals is provided, and a farm station, belonging to the institute, is easily accessible. A museum of specimens illustrating the diseases of animals is being established.

FEES FOR COURSE—TEN GUINEAS.

Hall of Residence.—Board and residence may be secured here (44 Upper Parliament Street). *Charges*, for a period of not less than two months, £1 a week inclusive; for a less period, 25s.

ABSTRACTS FROM A REPORT ON MENINGITIS IN HORSES, CATTLE, SHEEP, AND SWINE.

BY LOUIS B. WILSON, M.D., FIRST ASSISTANT BACTERIOLOGIST; AND S. D. BRIMHALL, V.M.D., DIRECTOR, VETERINARY DEPARTMENT.

(From the Nineteenth Report of the Minnesota State Board of Health.)

Introductory.—Meningitis in horses, cattle, sheep, and swine has occurred in Minnesota in small isolated outbreaks a number of times during the last few years. The first outbreak investigated in detail by this Board was that reported in the Biennial Report for 1898, page 180, in which an organism not distinguishable from *diplococcus intracellularis meningitidis, Weichselbaum*, was isolated from the central nervous system of a cow, the fifth to die on a farm near Rosemount. In the Biennial Report for 1899-1900, page 459, two other outbreaks in cattle were reported; one at the State Experiment Station, and the other near Lake Minnetonka. Both of these were shown to be due to *diplococcus pneumoniæ*. In the same report, pages 285 and 460, is recorded the history of an outbreak of meningitis in horses near Herman. These were typical cases (seven in all) in history, symptoms,

and lesions. The last inoculation experiment from this outbreak reported in the previous Biennial Report (see page 462, horse No. 3) was incomplete at the time of the writing of the report. The first portion of this experiment is herewith repeated in connection with the final results of the experiment.

Horse No. 3. Very old. Tested with mallein, May 25, 1900; no reaction. Inoculated into left carotid artery, May 29th, with 3·5 c.c. of twenty-four and forty-eight-hour broth culture, emulsified with twenty-four and forty-eight-hour serum culture of diplococcus of *Herman meningitis stock*, second culture from brain of horse No. 2.

Animal showed no symptoms up to and including June 15th, and remained well (no rise of temperature).

June 15, 1900, at 2.30 P.M., animal inoculated subcutaneously just back of left shoulder with 500 c.c. forty-eight-hour plain broth culture of diplococcus from *Herman meningitis stock* "original." (Not passed through horse No. 2.) Also subcutaneously behind left shoulder with 500 c.c. forty-eight-hour plain broth culture of diplococcus from *Herman meningitis stock;* third culture from horse No. 2.

Friday, June 22nd, specimen of pus collected from abscess on left shoulder. Abscess had opened itself within the previous hour. Direct coverslip preparations showed abundant diplococci. No other micro-organisms observed.

Cultures on Löffler's serum and on plain broth after twenty-four hours in incubator showed only diplococci present.

Nothing further occurred until Sunday morning, July 8, 1900, when horse noticed by attendant to be apparently "off his feed." Sunday evening was down, making frequent efforts to rise, being apparently weak in his back. Was able to rise on his fore feet, but could proceed no further toward getting up. Horse tried to eat while down. Temperature taken Tuesday, July 10th, at 3 P.M., subnormal. Animal found dead morning of Wednesday, July 11th, still warm.

Autopsy at 9 A.M. on the same day. Congestion of vessels, particularly the minute capillaries of the pia. No marked exudate in brain. Similar congestion in vessels of cord in cervical and lumbar regions. The left lung showed numerous small nodules, some of which contained a cheesy deposit surrounded by a tough capsule. One old scar and one nodule on the nasal septem. No ulcers.

Direct coverslip and serum and broth cultures were made from the meninges of (*a*) the superior surface of the cerebrum; (*b*) inferior surface of the temporal lobes; (*c*) cervical cord; (*d*) lumbar cord. Cultures also were taken from one nodule in lung.

Direct Coverslip Preparations.

(*a*) From superior surface of cerebrum showed no bacteria.
(*b*) From base of brain, a few diplococci.
(*c*) From cervical cord, many diplococci.
(*d*) From lumbar cord, few diplococci.
(*e*) From various nodules in lung, no bacteria.

Cultural Examinations.

(*a*) From superior surface of cerebrum, no growth either in broth or on serum.

(*b*) From base of brain, in broth fair growth; on serum, about twenty colonies of diplococci.
(*c*) From cervical cord, in broth, good growth; on serum, numerous isolated colonies, all diplococci.
(*d*) From lumbar cord, in broth, fair growth; on serum, about twenty colonies of diplococci.
(*e*) From nodule in lung, in broth, very abundant growth of small unevenly staining bacilli, probably *B. coli communis*.

The results of these two inoculations (see the above and horse No. 2, page 462, Biennial Report for 1899-1900) would seem to prove beyond a doubt the ætiological relationship of *diplococcus pneumoniæ* to the disease.

The following is a detailed statement of the examinations of cases of meningitis made from Jan. 1, 1901, to April 23, 1903:

Osakis, Douglas County (*Horses*)—Nov. 28, 1900, Dr. Brimhall visited the farm of Mr. F. P., near Osakis, Douglas County, to investigate the cause of death in horses. Mr. P. had lost four horses in a little over a week, and a fifth had been sick, but recovered. Those which died were sick from twenty-four to thirty-six hours. As they had all been dead several days, post-mortem examinations were out of the question, but from the description given by the owner, Dr. Brimhall felt certain that the cause of death was due to cerebro-spinal meningitis.

Another man living about ten miles north of Osakis had lost five horses with what he thought was the same trouble, but they had been dying one at a time for a period of three months. The diagnosis was very doubtful.

Torah, Stearns County (*Cattle*).—On Jan. 12, 1901, there was received from H. Bouman, M.D., Torah, Minn., the head of a cow, the fifth to die on a farm near Torah. All the cattle except one were yearlings. They had been fed with corn stalks and unhusked corn. The symptoms noted were about the same in all animals. They refused to eat, showed great prostration, and were unable to rise after the first day. The eyes were inflamed and swollen, with considerable discharge from both eyes and nose. There seemed to be marked fever, though temperatures were not taken. One died after two days' illness, three after three days' illness, and one after two days' illness.

When the head was received in the laboratory it was in good condition, and on opening the skull well marked meningitis was present. Diplococcus pneumoniæ was found abundantly in coverslip preparations and unmixed with other organisms in cultures.

Chanhassen Township, Carver County (*Cattle*).—Jan. 20, 1901, Dr. Brimhall visited the farm of Mr. A. H., Chanhassen Township, Carver County, to investigate the cause of death of Mr. H.'s cattle. Mr. H. had originally sixteen cows and two calves. Five of the cows had died after very short periods of illness, during which they showed rapidly ascending paralysis. One cow which had been sick and paralysed so that she was unable to get on her feet had so far recovered at the time of Dr. Brimhall's visit that she was able to stand, though with difficulty. The owner gave a very clear description of the symptoms shown by cattle, and Dr. Brimhall diagnosed the disease as cerebro-spinal meningitis. Isolation of the healthy cattle and disinfection of the stable was recommended. No further trouble from the disease arose.

Faribault, Rice County (*Cattle*).—June 21, 1901, Drs. Brimhall and

Wilson, in company with Dr. L. Hay, of Faribault, visited the farm of Mr. S., nine miles north-west of Faribault. About the first of April Mr. S. had lost a two-month's-old calf, which at that time was being fed on milk from the creamery. About a month later he lost a six-months'-old steer, and between that time and June 21 six other cattle, eight in all, had died. There were twenty-one animals originally in the herd. About half of them were cows and the remainder yearlings or six-months'-old steers and heifers. Five of the young cattle and three cows had already died. The owner said that all the animals exhibited practically the same symptoms. They first became somewhat stupid, had a wild staring look in the eyes and seemed slightly stiff in the back. After a short time they all became crazy, and rushed about the barnyard and attempted to bunt the other cattle and the owner. The posterior portion of the body then became paralysed. Throughout the disease all the animals made frequent straining attempts to pass fæces; all had diarrhœa, which in most cases was bloody. The animals died in from one to four days after showing symptoms of the disease. The local "cow doctor" examined some of the sick animals and pronounced the disease diphtheria. About June 15, Dr. Hay saw one of the sick animals, which was almost dead at the time. He killed it and made an autopsy. He did not skin the carcase nor examine the central nervous system, but otherwise the autopsy was complete. No lesions were found except a slight degree of entero-colitis. June 21 a small red cow had been sick for two days, but the owner thought she was a little improved over what she had been the previous day. She presented a staring condition of the eyes with stiffness and slight inco-ordination of the hind legs. Her temperature was 102·5°. The owner was instructed to ship the head and neck, in case the cow died, packed in ice to the laboratory.

Barden Township, Carver County (*Swine*).—Jan. 9, 1903, Mr. C. P. C. of Barden, Carver County, shipped to the laboratory three pigs, of which he gave the following history: "The original litter contained nine pigs. They were born about Sept. 1, 1902, and had thriven well all the season until about the middle of December, when one was noticed having some trouble, which seemed like fits, coming on usually after they first came to the trough in the morning. They would get up to the trough and start to eat and then suddenly back up and sometimes would fall flat and breathe very hard with a grunting noise. This would last for an hour or more and then they would apparently be as well as ever. These spells became more frequent and longer in duration. The pigs died after about two weeks' sickness. Seven died, two were shipped to the laboratory along with a third healthy pig from another litter.

After arriving at the Laboratory of Animal Research the two sick ones showed spells similar to attacks of epilepsy, the smaller of the two having it much more severely. On this pig (No. 28 laboratory series), the following observations were made: The first attack came on the day after arrival and soon after having drunk water. The pig "backed up" and stood very stiffly. He made a peculiar grunting noise with each short, gasping respiration. This was quite typical of all the attacks, but after an attack which occurred on the 31st he breathed freely, but continued to show the short, grunting respiration. Animal was somewhat stiff all the time. Later the respiration seemed to improve, but the hind legs became weak and sufficiently paralysed so as to prevent the animal from standing up. Temperatures were taken as follows: January

12, 103·8°; January 14, 103°; January 19, 104·3°. The pig was killed January 20 for the purpose of autopsy. No lesions were found except a small hæmorrhage in larynx at the side just above the cricoid cartilage. The pia at the base of the medulla was somewhat hæmorrhagic. Cultures from the lumbar cord and kidney showed no growth. Those from the medulla, liver, heart's blood showed diplococci; from the spleen a large non-motile bacillus (probably a contamination).

Rabbits Nos. 664 and 684 were inoculated intravenously and subdurally respectively, with cultures of the diplococcus from this case, but showed no symptoms during the ensuing two months, after which time they were used for other inoculations.

The other sick pig, No. 30 laboratory series, presented much the same symptoms as its companion. January 12 its temperature was 104·8°; January 19, 104·6°. Died January 24. Autopsy showed no gross lesions except marked injection of the mesenteric vessels, a few collapsed areas in one lung and some evidence of meningitis. Cultures from the heart's blood showed no growth; from the kidney liver and spleen streptococci in short chains; and from the meninges diplococci and streptococci.

From the facts above given it would seem that both pigs were suffering from infection of *diplococcus pneumoniæ* with a secondary infection of streptococci in one of the animals. The low virulence of the organism may account for the somewhat chronic nature of the disease. The cases are, however, too few to warrant the drawing of any sweeping conclusions.

Hayward Township, Freeborn County (*Horses*).—Jan. 8, 1903, Dr. Annand visited the farm of Mr. G. P. T., three miles east of Glenville, Minn., Hayward Township, Freeborn County, to investigate a disease of horses.

Beginning about three weeks prior to the onset of the first symptoms Mr. T. had fed his horses on ensilage. On opening the silo some of the material from the top had been found considerably decomposed. This had been forked off and scattered about the barnyard. When the horses were first put on the fresh ensilage they refused it, but after a little time began to eat it quite freely.

According to the history obtained from the owner, "one mare was noticed not right at 4 P.M., Jan. 2, 1903. First symptoms noticed were slobbering; about three hours later uneasiness in the stall; at 8 P.M. noticed that animal had lost power of deglutition. At the same hour noticed the animal trembling some. At 9 P.M. started to sweat, went down and unable to rise sometime between 10 and 11 P.M. When seen, paralysed, tongue extended and the animal went from bad to worse until she died at 3 P.M., Jan. 3, 1903. This animal was seven years old and weighed 1800 pounds. No post-mortem made."

The horse on which Dr. Annand held a post-mortem was noticed to be sick on Monday evening, January 5, and followed very much the same course as the other one, except that it was not quite so aggravated, and died about 8 o'clock P.M., Jan. 7, 1903, after forty-eight hours' sickness.

Post-mortem made at 3 P.M., January 8. On cutting the animal open the first thing noticed was hydrothorax and some fluid in the peritoneal cavity. The right lung was somewhat congested; the heart on one side seemed to be somewhat inflamed, but could not determine positively. It might have been hypostatic. The small intestines were somewhat injected and along the course of the mesenteric artery of small intestines there were

bloody deposits. The liver was somewhat dark in colour and quite easily torn. On opening up kidneys pustular matter was found in the pelvis. On removing the head a great amount of serum escaped and about the cord the meninges were more or less injected. On removing a portion of the spine in the sacro-lumbar region the vessels of the cord and its coverings were found much injected.

A portion of the lung, heart-wall, spleen, liver, kidney and spinal cord and the whole of the brain enclosed in the skull were brought to the laboratory in a frozen condition. Specimens were examined the morning of Jan. 10, 1903. The lungs showed small collapsed areas; the heart-wall showed a hæmorrhagic portion 1½ by 2 inches, very dark in colour and evidently a lesion present before death. The cortex of the kidney was much congested. The meninges of the spinal cord and brain were congested but showed no pus.

Portions of tissue from each of the organs were preserved in 10 per cent. formaldehyde and in 96 per cent. alcohol. Cultures were made in broth and on serum from each of the organs, including both the meninges and white matter of the brain. After forty-eight hours in the incubator a growth was present in and on all of the cultures, excepting those from the brain substance which showed no growth on either medium.

After careful picking of colonies and sowing out on various media, the following organisms were isolated from the different sources:—

Lungs.
(1) Streptococci in long chains; very numerous.
(2) Diplococci, apparently *diplococcus pneumoniæ.*
(3) *B. coli communis.*

Heart Wall. Streptococci only; long chains.

Spleen.
(1) Streptococci in long chains.
(2) Staphylococcus (albus ?).

Liver.—Streptococci.

Kidney.—Streptococci.

Meninges of spinal cord.—Streptococci, diplococci and large spore-bearing (putrefactive ?) bacilli.

Meninges of brain.—
(1.) Streptococci and diplococci.
(2.) Staphylococcus albus.

Brain substance.—No growth.

At the time of Dr. Annand's visit another horse was sick. Temperature was 100·5°, respiration 22, pulse 58, mucous membrane of eyes was somewhat injected.

Jan. 28, 1903, Drs. Brimhall and Wilson visited the farm of Mr. G. P. T. again. On arrival a seven-year-old grey horse, No. 29 Laboratory series, which had been sick for ten days, was found down on its right side in the barn. The animal began ailing on January 11 and went down on January 18. The owner did not think until the horse went down that it was suffering from the same disease of which the others died. During this time Mr. T. had fed it on gruel, milk, &c., from a bottle, it being unable to swallow coarse food. The animal was apparently unable to make even an effort to rise, though it was able to freely move both front and hind legs. It could raise its nose but not its head. Sensation seemed to be entirely

absent over the posterior extremities. Temperature of this animal was 105·2° at 8.30 A.M., January 22. This was the fourth animal out of five which Mr. T. had lost, the second being the one from which specimens were collected by Dr. Annand, Jan. 8, 1903.

The third was the horse noted by Dr. Annand as becoming sick on January 8, and concerning which data was to be supplied by Mr. T. The animal died January 12. Shortly after Dr. Annand's visit two other horses were hired from a neighbour to do the work of the farm, but were kept in a shed apart from that in which Mr. T.'s horses had been sick. However, a door opened from this shed into the barn in which the sick horses had been kept.

Horse noted above was killed by bleeding, and an autopsy made at once. The throat, posterior pharynx and trachea were apparently normal. Lungs showed hypostatic congestion in the dependent portions, and a strip of consolidated tissue in the centre of the anterior lobe about three inches long and one-half inch wide on the left side. Several areas of hœmorrhage from one-fourth to one inch in diameter were found under the endocardium. The spleen was small and rather dried than normal. The liver was apparently fatty. The intestines and mesentery were apparently normal except for the presence of several aneurisms containing worms,—*strongulus armatus*—in the mesenteric arteries. The kidneys were apparently normal —except for a clot—extracapsular—about the right (lower) kidney. On opening the spinal cord at the cervical region a large amount of reddish coloured serum escaped. The meninges of the brain and cord were congested, but showed no pus. Congestion was most intense about the pons and base of the cerebrum. In the lumbar region of the cord small flakes of yellowish exudate (*fibrin*) were found attached to the pia of the cord.

Direct coverslip preparations, cultures and tissues for histological examination were collected from the trachea, lung, heart, spleen, liver, right hock and meninges of brain and spinal cord in the cervical and lumbar regions.

Direct coverslip preparations stained with eosin and methylene blue on examination showed bacteria, as follows :—

Lung.—Diplococci.
Heart's blood.—Negative.
Spleen.—Negative.
Liver.—Negative.
Right hock.—Negative.
Meninges of brain.—Diplococci (lanceolate, encapsulated, Gram-staining, some intracellular and some extracellular.)
Cervical spinal cord.—Ditto.
Lumbar spinal cord.—Ditto.

Cultures in broth and on serum after incubation showed bacteria as follows :—

Trachea.—Numerous large and small bacilli; staphylococci. (No diplococci.)
Lung.—Diplococci.
Heart's blood.—Negative.
Spleen.—A few streptococci.
Liver.—Negative.
Right hock.—Negative.

Meninges of brain.—Diplococci (lanceolate Gram-staining.)
Meninges of cervical spinal cord.—Diplococci (lanceolate, Gram-staining.)
Meninges of lumbar spinal cord.—Diplococci (lanceolate, Gram-staining.)

The diplococci isolated from the meninges of brain and spinal cord and from the lung gave a turbid growth in broth and after twenty-four hours a slight precipitate. On agar, white isolated colonies about 0·5 mm. in diameter.

In and on litmus lactose and litmus dextrose agar colonies developed similar to those on plain agar. The acid reaction on these media was variable within narrow limits, but there was no formation of gas bubbles.

On serum the colonies were somewhat larger in diameter than on agar, pasty in appearance and of the colour of the serum.

No visible change was produced in milk after eight days' growth in the incubator.

In gelatin stab cultures only a very faint growth took place along the needle track after eight days.

Rabbit 671 was inoculated intravenously with 0·3 c.c. of a broth culture, fifth generation of the diplococcus from this horse. Animal died after four days.

At autopsy many diplococci were found in the exudate from the meninges both within and outside of the leucocytes. One small focus of pus was present in the right lung. No other gross lesions were discoverable.

Rabbit No. 685 was inoculated February 28, in left subdural space with 0·2 c.c. with emulsion of the serum culture from this case. The animal began to exhibit symptoms of meningitis on second day after inoculation and died seven days later. Marked meningitis was present at autopsy and *diplococcus pneumoniæ* was recovered from the meninges.

There can be no doubt that these cases were *meningitis* due to *diplococcus pneumoniæ*. The same train of symptoms has however been reported by Pearson [1] as being reproduced by him in horses by feeding with ensilage. Therefore, in order to determine whether the ensilage had anything to do with the direct production of the disease or with transmitting the organism to horses, the following experiments were conducted.[2]

Summary.—1. The preceding detailed statement and table show that from September 1898 to April 1903 this board has investigated five outbreaks of cerebro-spinal meningitis in horses, eight in cattle, one in sheep, and one in swine, making fifteen outbreaks in all. These have been distributed in eleven counties. Of the twenty-nine horses sick of the disease twenty-eight have died. Of the thirty-six sick cattle thirty-three have died. All of the eight sheep and nine swine sick of the disease died, making a total of eighty-two sick animals with seventy-eight deaths, or a mortality of about 95 per cent.

2. The symptoms may be summarised as follows :—

Horses.—There was usually "slobbering" at the mouth, uneasiness, loss of power of deglutition, posterior inco-ordination, gradual posterior paralysis, rapidly ascending, and rapid loss of sensation over posterior extremities. In some instances evidence of involvement of the meninges

[1] Pearson. Journal of Comparative Medicine and Veterinary Archives, 1900, volume XXI., page 654.
[2] See Report.

of the brain was shown by frenzy and failure of pupils of eyes to react to light. Temperatures ran as high as 105° F., but dropped to normal or subnormal as paralysis ascended.

Cattle.—In most of the cattle examined the symptoms indicated early brain involvement. The animals, at first somewhat stupid, but with a wild staring look in the eyes, shortly became frenzied and rushed about the enclosure attacking other animals. The pupils failed to react to light and some of the animals became, apparently, completely blind. After a short time the posterior extremities showed inco-ordination, which was followed by both motor and sensory paralysis, which progressed to the death of the animal.

Sheep.—In the only outbreak observed among sheep the symptoms began with listlessness and drooping and shaking of the head. After a little while the animals became unable to stand. When lying down the head was retracted as far as possible. Animals died after an illness lasting from two to fourteen days.

Swine.—In the only outbreak observed in swine the disease took a subacute course. The animals had recurrent "fits," during which time they had short gasping respiration and paralysis of the posterior extremities. The attacks became more frequent and longer in duration after a few days until the animals were completely paralysed. The paralysis slowly increased and the animals died after about two weeks' illness.

3. No significant lesions were found at autopsy in any of the animals except in the central nervous system. In horses, on opening the spinal canal, a large amount of yellowish or red-coloured serum escaped. In several cases a quantity of yellowish coagulated serum (fibrin) was attached to the pia of the cord and base of the brain. The meninges of both the cord and the brain were uniformly congested, especially in the cervical region of the cord and about the base of the cerebrum.

In cattle, while there was some increase in the amount of cerebro-spinal fluid, it was not so markedly increased as in the horses. The meningeal inflammation was clearly observable. This was especially true of the base of the brain and upper spinal cord.

The same was true of the sheep and swine examined.

4. Of the nine horses on which laboratory examinations have been made, all have shown histological lesions of meningitis with the presence of diplococcus pneumoniæ in direct coverslip preparations, tissues, and cultures from the central nervous system.

During the time that the examinations were being made on the above-mentioned cases of meningitis in horses, cattle, sheep, and swine similar examinations were made on sixteen cases of suspected meningitis in man. The strains of diplococci isolated from the human cases were carefully compared with those isolated from animals. It has been impossible to differentiate the organisms from diplococcus pneumoniæ obtained from human sources by cultural methods.[1] The variation in acid production and milk coagulation is not greater than between different strains isolated from human sources. When inoculated into rabbits, the organisms appear to have a uniformly less degree of virulence for these animals than do freshly isolated strains of diplococcus pneumoniæ from human sources. This variation, however, is not greater than the variation between different

[1] For cultural characteristics see page 461 Biennial Report this Board for 1899-1900, and p. 135 of this Report.

strains of diplococcus pneumoniæ from meningitis and pneumonia in man. Besides a number of rabbit inoculations the ætiological relationship of diplococcus pneumoniæ to meningitis in horses has been further shown by its inoculation into three horses, one subcutaneously, and into the carotid artery, another under the dura of the brain, and the third under the dura of the lumbar cord. All of these animals died after exhibiting symptoms of meningitis. At autopsy, the inoculated organism was recovered from the central nervous system unmixed with other bacteria.

It is worthy of note that one strain of diplococcus pneumoniæ originally from a *horse*, after a single passage through a rabbit, was inoculated into the dura of the lumbar cord of a *pig*. The pig died after exhibiting symptoms of meningitis and diplococcus pneumoniæ was obtained in direct coverslip preparations and cultures from the meninges of both cord and brain unmixed with other organisms.

It should be noted that of the five outbreaks of meningitis in horses only one gave a history of ensilage feeding. It so happened that all the other animals were good horses and were being well cared for and fed on good sound grain or hay. About one ton of ensilage from the silo concerned in the one outbreak noted above, was fed to two horses in the research laboratory without the production of any symptoms of meningitis. In the same outbreak *diplococcus pneumoniæ* was isolated from both of the two horses examined.

Of the five cows on which laboratory examinations were made, histological lesions of meningitis were present in all. From one an organism closely resembling, if not identical with, diplococcus intracellularis in man, was isolated. From three of the others, diplococci indistinguishable from diplococcus pneumoniæ were found in the meninges of the brain and cord.

From the meninges of the two sheep examined diplococcus pneumoniæ was isolated.

Cultures from the meninges of the two pigs examined showed diplococcus pneumoniæ.

5. The clinical diagnosis of meningitis due to diplococcus pneumoniæ in horses, cattle, sheep, and swine would seem to be exceedingly difficult to make. The disease described by Pearson[1] as forage poisoning in horses apparently so closely resembles meningitis due to diplococcus pneumoniæ that it would seem that only a careful bacteriological examination would serve to differentiate the two. The differentiation of the disease from rabies in cattle is practically impossible without a laboratory examination. The meningeal form of hæmorrhagic septicæmia in cattle (see page 113 of this report) does not ordinarily produce so much excitement as does meningitis in cattle due to diplococcus pneumoniæ, but where the meninges of the brain are early affected by *B. bovisepticus* (see *hæmorrhagic septicæmia* outbreak No. 75) the symptoms so closely resemble the symptoms caused by diplococcus pneumoniæ that a careful laboratory examination is necessary in order to differentiate the two.

In making post-mortem examinations of animals it must be borne in mind that the gross lesions of meningitis sometimes appear to be insufficient to account for the severity of the symptoms. The presence or absence of inflammatory changes or bacteria can frequently be determined only by histological and cultural examinations. If these are not carefully made, the meningeal character of a disease with suggestive symptoms cannot properly be excluded.

[1] Journal of Comparative Medicine and Veterinary Archives, 1900, vol. xxi., p. 654.

6. The treatment of meningitis as it has come under the observation of this board would seem to be of little avail.

7. The separation of the sick from the well animals and the careful disinfection with chemicals and by fire appear to be that the most effective means of checking the progress of the disease in a herd.

8. In connection with meningitis in various aninals, there has been planned in the laboratory a series of experiments consisting of cross inoculations and cross immunisations of various animals with cultures of diplococcus pneumoniæ from various sources, to determine the variation or identity of the infecting bacteria. In connection with this it was hoped that it might be possible to produce an immunising serum by means of some of the strains virulent to larger animals.

SYNOPSES OF PAPERS READ AND DISCUSSED AT THE PUBLIC HEALTH CONGRESS IN LIVERPOOL IN JULY 1903.

Bovine Tuberculosis and Public Health.

BY J. M'LAUCHLAN YOUNG, F.R.C.V.S., F.R.S.E., LECTURER ON VETERINARY HYGIENE, ABERDEEN UNIVERSITY.

Useful effect of the pronouncement of Dr. Koch before the British Congress on Tuberculosis in 1901. Productive of a Royal Commission, and attracting greater attention on the part of the public to the subject of tuberculosis in man and the lower animals.

Dr. Koch said, in concluding that part of his address referring especially to the possibility of bovine tuberculosis being transmitted to man : " I should estimate the extent of infection by milk and flesh of tubercular cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it."

Notwithstanding importance of above statement, the public authorities of this country, acting on the advice of our own professional men, fortunately made no relaxation of their precautionary and preventive measures, deciding that further proof was necessary.

Dr. Koch made the fact, that he was unable to produce lesions in cattle by inoculating them with tubercule bacilli from man, the basis of his argument that human tuberculosis differs from bovine.

First contradictory note sounded by Sir G. Brown, who said during the work of the Royal Commission, which went on from 1890 to 1895, he had inoculated cattle with human sputum, and they had taken tuberculosis. Crookshank also produced a tuberculous focus in the peritoneal cavity of a calf by injecting tubercular material from a human source into it.

Owing to the professional and commercial importance of the relation of human to bovine tuberculosis, a final verdict should not be pronounced until the volume of evidence which is now accumulating has been collated and analysed.

Results of experiments upon twenty calves by myself and Professor Hamilton left no doubt in our minds that human tubercule can be readily inoculated upon bovines.

Experiments proved that the injection of tuberculin, although it may

for a time render a tuberculous animal immune to a second testing, it had no such effect against bacilli when introduced into the body by any of the various methods.

Is human tuberculosis transmissible to cattle? Yes.

The more crucial question—Is bovine tuberculosis communicable to man?—can never be proved experimentally; but many cases of accidental inoculation have been recorded.

Only two ways the disease can be transmitted to man. Aerial and alimentary.

Transmission by aerial means most unlikely, owing to requirements of authorities as to cubic capacity and ventilation of byres.

Danger of contracting the disease through food supply liable to be overrated. Tubercular lesions being most frequently found in parts which could easily be removed without damage to the carcases; also owing to the fact that the flesh is cooked before being ingested.

Freibrant system of Germany suggested. Certain carcases recognised to be unwholesome only when uncooked. Meat, after being cut up into pieces of four pounds each, is cooked under supervision of the officials, and sold to the poorer classes at a reduced rate.

Milk the most potent factor in the transmission of tuberculosis from cattle to man.

Tubercular milk cause of the increase in infant mortality.

Development of tubercular focus may not take place until adult life, although infection took place during infancy when on milk diet.

Only when the cow is suffering from tubercular mammitis does the milk possess a virulency capable of inducing tuberculosis in the consumer.

Custom of mixing the milk of cows a source of infection.

In conclusion. It has been abundantly proved that human tuberculosis is capable of transmission to bovines, and, although it may never be conclusively decided, I venture the opinion that the converse is equally true, viz., that bovine tuberculosis is transmissible to man.

The Milk Supply of Large Towns: Production, Delivery, Quality, Purity.

BY J. S. LLOYD, M.R.C.V.S., VETERINARY INSPECTOR, CITY OF SHEFFIELD.

Milk as an article of diet,

Sources of production—urban, suburban and rural.

Description of surroundings from which milk is produced. Shippons, water-supply, cleanliness of cattle, milking, &c.

Suggestions as to the milking of cows.

Description of mode of delivery, and its effect upon the quality of the milk.

Quality. Requirements of Sale of Milk Regulations issued by Board of Agriculture, 1901. Opinion as to how milk samples comply with these requirements.

Variations in the composition or quality of genuine milk.

Statistics as to results of investigations conducted in 1900 by Mr. Herbert Ingle, of the Yorkshire Agricultural College, and published in the Highland Society's transactions.

Causes of variations in quality of milk.

Effect of food, also the operation of milking, upon the quality of milk.

Adulteration of milk. Statistics as to percentage of prosecutions in various large towns for milk adulteration.

Methods of adulteration.

Purity. Origin of bacteria in milk. Causes of multiplication of bacteria in milk, and nature of germs found therein.

Diseases of human beings traced to milk supply.

Nature of cells in milk, and their origin. Purity of milk affected by food supply, bad smells, and dirty condition of cowshed and dairy utensils.

"Doctored" and "preserved" milk.

Methods of preserving milk by extreme heat and cold, generally known as Pasteurization and sterilization.

Municipal measures.

Particulars as to "humanised" and "certified" milk.

Desirability of additional measures to ensure good, pure milk supply, and suggestions for municipal authorities.

The Susceptibility of the Pig to Human Tuberculosis.

BY GEORGE DEAN, M.A., M.B., C.M., BACTERIOLOGIST, SERUM DEPARTMENT, JENNER INSTITUTE OF PREVENTIVE MEDICINE; AND

CHARLES TODD, M.D., D.P.H., ASSISTANT BACTERIOLOGIST, SERUM DEPARTMENT, JENNER INSTITUTE OF PREVENTIVE MEDICINE.

The frequency with which tuberculosis occurs in the pig varies greatly in different countries. Nocard points out that it is particularly frequent where there is a large milk industry, and where the animals are fed on skimmed milk and the refuse from centrifugalised milk. In Denmark, for example, 14 per cent. of the pigs slaughtered are found to be infected; whereas in the United States the disease is particularly rare, the ratio being only 1 in 10,000.

It is pretty generally agreed that the bovine species is the common source of this infection in the pig, and the lesions in such cases point to ingestion as the primary means of infection. The tonsillar and alimentary lymphatic glands are first attacked, often without visible lesion of the mucous membrane.

A marked feature of natural tuberculosis in the pig is the common occurrence in the viscera of large encapsulated tubercles which can be readily shelled out from the organs. These have a marked resemblance to the solitary tubercles which are sometimes found in the human subject, especially in the central nervous system.

The close association of man and the pig, particularly in certain countries, makes the question whether tuberculosis of human origin is capable of giving rise to infection in this animal especially interesting, and this might form a suitable inquiry from the statistical side.

In the course of a series of experiments carried out by us at the suggestion of Lord Lister, we obtained certain results bearing on this point.

The first series of experiments consisted in inoculating pigs subcutaneously with sputum from patients suffering from advanced pulmonary tuberculosis. Six pigs were so inoculated, and five of these succumbed as the result of the tuberculous infection. The sixth pig, when killed 227 days after inoculation, presented well-marked tuberculous lesions. In some of the animals the course run by the disease was extremely acute;

thus, one of the animals died in 31 days, and another in 47 days, after the infection. In all these animals there was a local tuberculous focus; the glands and the lungs were infected in every case, and in some the liver, kidneys, and spleen were also affected. In certain of the animals, where the infective process was prolonged, the tuberculous nodules showed the same encapsulated, sharply circumscribed character which is met with in the natural infection. From a number of the lesions pure cultivations of the tubercle bacillus were successfully obtained, and in all the animals the bacillus was demonstrated histologically, and by animal experiments.

The second series consisted of three pigs, which were fed with human tuberculous sputum. In all of these a local tuberculosis of the lymphatic glands was demonstrated.

The three animals used for these experiments were from a litter of seven, bread from a healthy sow. Three were kept as controls, and one was used for another experiment (subcutaneous injection).

When the animals were two months old they were removed from the sow, and were fed on coarse wheat meal ("middlings") mixed with water, to which tuberculous sputum was added.

The animals received as a rule each about 15 cc. at one feeding, but on two occasions very much larger quantities were given—about 100 cc.[1] to each animal.

Nearly two months after the beginning of the experiments the average weight of the three controls was 53lb., whereas the average weight of the three experimental animals was 27lb.

These three animals all died after a period of about 80 days with severe emaciation, and showed a tuberculous infection of the tonsillar and cervical glands.

Professor Koch, in the paper in which he formulated his recently expressed views as to the essential difference between the bacillus of human and of bovine tuberculosis, and as to the consequent slight danger to the human subject from ingestion of tuberculous material of bovine origin, based his views largely on certain experiments on various domestic animals.

As these experiments are fundamental, and form part of the chain of evidence on which Professor Koch bases his views, it is important to ascertain whether different results might follow under slight modification of the experimental conditions.

Professor Koch, at a later period, published the details of the experiments on which he based his views. We have recently come into possession of these detailed reports, and find that the results obtained by us in the pig, especially by subcutaneous injection, differ materially from those obtained by him. Professor Koch, using two pigs, was unable to produce infection with the human bacillus by subcutaneous inoculation.

In our experiments, on the other hand, the six animals employed were all infected with the human bacillus, and the character of the infection was at least as severe as that described by Professor Koch as the result of inoculation of the pig with the bovine bacillus.

Professor Koch employed pure cultures of the bacillus, while in our experiments tuberculous sputum was used.

The difference in the results obtained is probably to be attributed to this fact, in which case the greater infective power of the tuberculous sputum may be due to various factors, *e.g.*:—

[1] Full details of these experiments will be found in a paper by the Authors in the *Journal of Pathology and Bacteriology*, May 1903.

1. In the sputum the bacillus probably retains its original virulence and has undergone no modification, as may be the case on cultivation.
2. The associated organisms, or their products in the sputum, may assist in the process of infection.

We are aware that Professor Koch's experiments are comparative, but when the numbers used are so small—two animals for subcutaneous inoculation with human tubercle bacilli, and two with bovine tubercle bacilli—and when only one race of each type of bacillus is used, grave risks of error are incurred. One of these may be indicated, namely, that the race of human tubercle bacillus employed may have been one of comparatively low virulence.

With reference to the experiments on feeding with tuberculous sputum, Professor Koch obtained some form of infection in three of the six animals employed by him.

In our feeding experiments only three pigs were used, and all contracted a local but very definite infection, with great wasting followed by death. The tuberculous lesions appeared hardly sufficient to account for death, or for the emaciation; but it is to be noted that the animals were somewhat younger than those employed by Professor Koch, and that the feeding was commenced at the period of weaning, when young animals are liable to catarrhal intestinal disturbances. Moreover, the sputum employed, having been sent by post, was usually twenty-four hours old, and contained numerous putrefactive organisms and their products.

INOCULATED SUBCUTANEOUSLY WITH SPUTUM.

No.	Weight.	Sputum.	Died.	Killed.	Number of Days.	Weight.	Lesions.
1	29½ lb.	Patient S.	...	+	227	56 lb.	Tubercles, local; bronchial and mediastinal glands, lungs, liver.
2	30 ,,	,, R.	+	...	137	24 ,,	Tubercles, local; abscesses, inguinal and lumbar glands, lung, liver, spleen.
3	19 ,,	,, ,,	+	...	47	16½ ,,	Tubercles, local; lumbar and bronchial glands, lungs, liver, spleen, kidneys.
14	58 ,,	,, H.	+	...	102	70 ,,	Tubercles, local; lumbar glands, lungs.
16	20 ,,	,, ,,	+	...	146	24 ,,	Tubercles, local; inguinal and lumbar glands, lungs, liver, spleen.
7	35 ,,	,,	+	...	31	24 ,,	Tubercles, local; inguinal and lumbar glands, lung.

FEEDING WITH SPUTUM.

8	35 lb.	Patient H.	+	...	82	26 lb.	Tubercles, tonsillar and cervical glands.
9	30 ,,	,, ,,	+	...	72	23 ,,	Tubercles, tonsillar glands.
10	36 ,,	,, ,, J. S.	+	...	78	26 ,,	Tubercles, tonsillar and cervical glands.

NATIVE BELIEFS REGARDING THE HAIRMARKS ON HORSES AND CATTLE.

BY J. D. E. HOLMES, M.A., M.R.C.V.S., VETERINARY LIEUTENANT, INDIAN CIVIL VETERINARY DEPARTMENT, SUPERINTENDENT, CIVIL VETERINARY DEPARTMENT, MADRAS.

THROUGHOUT India, but more especially in the Southern Presidency, among the native population, the value of a horse or ox principally depends on the existence and situation of certain hairmarks on the body of the animal. These hairmarks are formed by the changes in the direction in which the hair grows at certain places and according to their shape are called a crown, ridge or feather mark. The relative position of these marks is supposed to indicate that the animal will bring good or bad luck to the owner and his relatives.

There is a saying that "a man may face a rifle fire and may escape, but he cannot avoid the luck, good or evil, foretold by hairmarks."

The purchaser first considers these marks, and if they are propitious, the points of conformation, age, and soundness are of little importance. So much are the people influenced by these omens that they seldom keep an animal with unlucky marks and would not allow their mares to be covered by a stallion having unpropitious marks.

In the Northern Provinces owners and breeders are not so much guided by these superstitions, because by them the good and bad points of a horse are better understood. In purchasing cattle less stress is laid on these marks than in the selection of a horse. In purchasing a cow, her hairmarks are not at all considered, a cow being held sacred and auspicious under all circumstances. The hairmarks on the body of a bullock born and bred in the house indicate neither good nor ill luck.

The following is a description of these marks and the significance attached to them :—

HORSES.

Lucky Marks.

(1.) "*Deobund*" (having control over evil spirits), also termed "*Devuman*" or "*Devumani*," said by Muhammadans to represent the Prophet's finger, and by Hindus to represent a temple bell.

This mark is a ridge, one to three inches long, situated between the throat and counter along the line of trachea. It is the most lucky mark a horse can possess. It is compared to the sun, and therefore, when it is present, none of the evil stars can shine and all unlucky omens are overruled.

(2.) *Khanta* (neck) or *Khantabharanam* (neck ornament) is a mark in shape like a lotus flower situated on the line of trachea, one or two inches below the angle of the jaw. It is said to represent the moon and to be next in power to Devumani. If it is placed on the level of the angle of the jaw, or on either side of the line of the trachea, it is called "Galkhod" or "Mannaipudi" (compressor of the neck) and is then an unlucky mark.

(3.) "*Masthak* (head).—Two crowns on the poll at either side. These marks should be opposite each other. If not opposite they are called "Theescut" and are then considered unlucky. It is also unlucky if one mark only is present. By some, Masthak is considered a neutral mark.

(4.) "*Torun*" (anklet) "Chimta." — Two crowns on the forehead

situated horizontally above the inner canthus. By some, this is considered a neutral and by others an unlucky mark.

(5.) "*Punchkallian*" (five buds).—A horse of any colour except white or grey having a white mark on the face (star race snip or blaze) and also four white legs or pasterns is held to be very lucky.

(6.) White, dun, grey, piebald and skewbald are considered lucky and much sought after by natives.

Unlucky Marks.

(1.) *Herdavel* or *Herda.*—A crown or an irregular shaped mark, on the counter near or upon the sternum. This is considered the most unlucky mark, and to indicate that the owner of the animal will die a sudden death.

(2.) *Ansoodhal* (weeping) is a crown on the forehead situated below the line of the inner canthus. If this mark is very low down, it is called "Gadha Bhownuri" (donkey mark).

(3.) *Beherachad* (breaker of water pots) or *Chattri* (umbrella).—Two crowns on the forehead situated longitudinally one above the other; if one is inclined to one side, it is called *Behra Fore.* This mark is unlucky; also if there are three crowns in form of a triangle or three in a line. *Chulla* (fireplace) or three or more crowns in a row, it is a sign of bad luck. A double row of crowns is called "*Sera*" (bridegroom) and indicates that the owner will always be a bridegroom; if he is a bachelor, he will soon be married, and if a married man he will soon lose his wife, and marry again.

(4.) *Gome* (centipede) is a small crown placed under the chest about the girth. This is a very unlucky mark.

(5.) *Gungapet* is a large crown on the abdomen between the sternum and the sheath.

(6.) *Sápeen* (snake).—When there is a crown on one side of the neck and none on the opposite side, or two on one side and one on the other, the mark is known as Sápeen and is considered most unlucky. If there are two on both sides, it is called *Tháthri* and is a neutral mark.

If there is one on both sides it is termed *Doa Bago* and is a neutral mark.

(7.) *Peth Sápeen* or *Hasthencode* is a crown on the withers.

(8.) *Janaza* (coffin).—This term is applied when the Masthak (head) marks are present and from them on either side there are two ridges, one to three inches long, running down the neck.

If there is a ridge on one side only it is termed *akbagee.* Both are very unlucky marks.

(9.) *Theescut* is the term applied when the Masthak (head) marks are not opposite each other and is by some considered a neutral mark.

(10.) *Galkhod* or *Mannaipudi.*—When the *Khantabharanam* neck ornament mark is situated at the angle of the neck or at either side of the trachea, it is called *Galkhod* or *Mannaipudi.*

(11.) *Badi* (fetter).—A ridge of hair directed upwards on one or both fore arms on the outer side is said to indicate that the owner of the animal will be sent to jail.

If the hair is directed downwards it is a neutral mark.

(12.) *Khortagad* (peg driver) or *Khila Gad* is a ridge of hair directed downwards on one or both hind legs below the locks. It is said that no

horse in the stable will be sold so long as the horse with these marks is kept.

If the hair is directed upwards it is termed *Khoota Ukhad* or *Khila Upar*, and is a neutral mark.

(13.) *Thanni* (teat).—Teat-like projections on the sheath of the male are considered unlucky.

Neutral Marks.

(1.) *Raj Bhamro* (royal mark) or *Peishanikabhownra.*—A single crown on the forehead above the line of inner canthus.

(2.) *Chathika-Bhownra* (counter-marks).—Two ridges, some inches long, on either side of the counter. These should be identical in shape or size; if not, they are considered unlucky marks.

(3.) *Kookavir.*—Two feather marks, one on each flank.

(4.) *Petkabhownra.*—Two crowns on the abdomen behind umbelicus, on either side of median line. The absence of these above four marks is considered unlucky. It is essential that a horse should possess these four marks and also "masthak" marks.

(5.) *Kharta-Ukhad.*—A ridge on hind legs below hocks with the hair directed upwards.

(6.) *Doa Bago.*—A crown on both sides of the neck.

Cattle.

Lucky Marks.

(1.) *Támani Suli.*—A ridge of hair along the middle line of the back about its centre. "Támani" means a herd, and this mark indicates that the purchaser will acquire a large number of cattle.

(2.) *Irattai Kavam* consists of two ridges of hair, one on each side of the brisket. A single hairmark on one side of the brisket (Ottaikavam) is most unlucky, and forebodes the loss of all other cattle in the house and also the death of the purchaser.

(3.) *Bhashicam Suli* is a crown on the forehead above the line of the eyes. "*Bhashicam*" is the name of the wreath worn by bride and bridegroom during the marriage ceremony. If the purchaser be a bachelor or widower, this mark indicates that he will marry soon. If the purchaser be a married man, he will either have the misfortune to lose his wife and marry again, or the good fortune to obtain two wives.

(4.) *Gopura Suli.*—A crown upon, in front of, or immediately behind, the hump. Considered a very lucky mark.

(5.) *Nir Suli* is a crown situated on the middle line of the back, just opposite to the opening of the urethra. Regarding this the saying is that "The family will either be reduced to ashes or swell like a river." The hairmark is thus of doubtful signification. An intending purchaser rather than incur the risk of evil consequences will avoid the purchase. The ryots say that if a little earth be taken and rubbed on this hairmark the bullock will void urine.

(6.) *E'rupúrán* (ascending centipede).—A ridge of hair on the hind quarters curving up to the back is a sign of coming prosperity. If the ridge does not curve upwards to the back it is called *Irangupúrán* ("descending centipede"), and indicates adversity to the purchaser.

(7.) *Lakshumi Suli* is a hairmark situated on one side of the neck, at a

distance from the dewlap. "*Lakshumi*" is the goddess of fortune. This is considered to be the most lucky hairmark, but is rarely met with. A bullock with such a mark is highly esteemed, and fetches a long price.

Unlucky Marks.

(1.) *Mukkanti Suli* or *Agni Suli.*—Three crowns on the forehead arranged in form of a triangle said to represent the three eyes of Siva, of which the one in the forehead will, if opened, burn up all things within the range of vision.

This mark forebodes ruin to the purchaser.

(2.) *Kudai-mél-kudai.*—Two crowns one over the other on the forehead predict disaster after disaster.

(3.) *Ottai-Kavam.*—A single hairmark on one side of the brisket close to the middle line forebodes loss of all other cattle in the house and the death of the purchaser.

(4.) *Vilangu Suli* (fetters).—Hairmarks on the fetlocks of either pair of legs indicate that the purchaser will soon be in gaol.

(5.) *Pádai Suli.*—Two ridges of hair on the back on either side of the middle line; indicates that the purchaser will soon need a coffin.

(6.) *Irangupúrán* (descending centipede).—A ridge of hair on the hind quarters not curving upwards to the back indicates adversity.

(7.) *Nágappadam.*—A ridge of hair on the haunch spreading out at one end like the hood of a cobra. If the direction of the hood is upwards it is termed Munnágam, and if downwards Pinnágam.

(8.) *Tattu Suli* (obstacle).—A crown situated on the back between the points of the hips; indicates that any business undertaken by the purchaser will fail.

(9.) *Tudaippa Suli.*—A hairmark on the side of the tail near the root, sometimes extending as ridge over the back.

Other Superstitions regarding Cattle.

A bullock whose tail has the root of the tuft of hair situated above the hock is said to have "E'ru-vál," and to bring ill-luck. A cow having "E'ru-vál" is not objected to.

A bullock having white hair, skin, horns, and hoof is considered of weak constitution, and not to be purchased.

A black bullock is generally considered a rogue. If not a rogue, he is considered of great value according to the saying—"A black bullock is but the fourth of a bull, but if he be guileless he is a bullock and a quarter."

A bullock with numerous small spots over the body, "like a deer," is considered very lucky.

The form of the horns is supposed to indicate many things. The different forms of horns go by different names. For instance, Mádakkombu means horns bent backwards. This is a good sign in a cow. The saying is—"Let any man who does not know how to select a cow purchase one with horns curved backwards."

Straight horns, Silái, are liked. Horns pointed forwards, *Kópadá*, indicate spirit. Twisted horns, Churuttai, are considered good. Horns which are hollow and present white patches, looking as if they were rotten, "*Kollikkombu*," are considered very disastrous. Horns with white tops, *Púnkombu*, are also bad.

If a cow at the time of purchase voids urine, it is considered a very good omen, but if she passes dung it is a bad omen. The reverse is the case with a bullock.

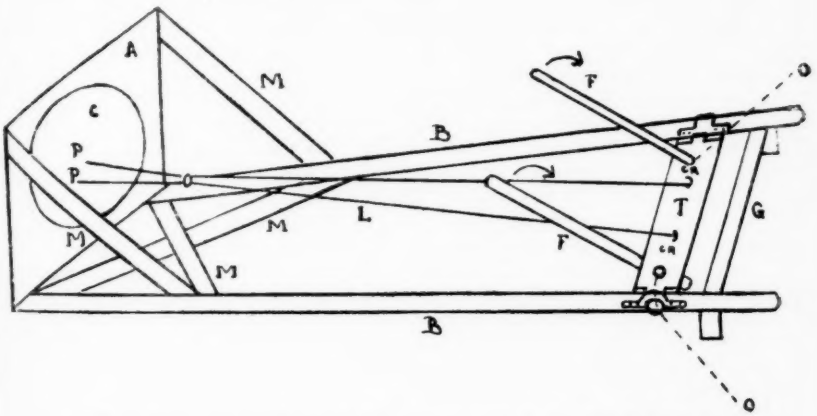
A bullock which fails to cut the fourth pair of permanent incisors is called A'rukatti-madu, and is considered lucky, that is, "One who purchases a bullock with only six permanent incisors will become rich enough to keep an elephant.

A bullock which cuts only seven permanent incisors is unlucky to the owner. The saying is that one who purchases such a bullock should have his coffin ready.

TRACTION AND COUNTER EXTENSION IN PARTURITION.

BY M. BEDEL, VETERINARY SURGEON, DOYULE, CALVADOS, FRANCE.

An apparatus termed a calver (*veluse*) is to be found in many farms in this part of France, and in many cases is of the greatest utility. It consists of a square piece of board, A., with a circular opening C. in the middle, about 16 inches in diameter, to which is secured two long pieces BB. about 6 feet 6 inches in length. The ends are strengthened and united by a cross, piece G. and it carries a windlass T. on which are two hooks, $C^R C^R$, equidistant from the centre, and two holes OO. into which the levers FF. fit, and by which the windlass is revolved. The arms BB. are also fastened to C. by the cross struts MMMM.



When the apparatus is used the square part A is placed against the cow's hind-quarters when she is lying down, and her tail and points of her thighs brought through the opening C. The feet of the fœtus PP. are each separately corded, and the cords secured to the rings D. on the ends of the chains LL., which are joined together at N. The other ends of the chains LL. are hooked over $C^R C^R$ on the windlass T.

Care must be taken that the tension on each cord is equal, but this is easily adjusted by drawing them tight. An assistant then is stationed at

each handle, which is revolved in the direction of the bent arrow, that is, from before backward.

Not only can great traction in a direct line be exercised by this operation, but it also exerts counter extension against the hind-quarters of the cow in the same way as a patent corkscrew does on the neck of a bottle, and all jerking is avoided.

Note.—The apparatus can be made by any village carpenter, but could be made portable by joining the arms BB. and making both them, the windlass T, and the struts MMMM. and G. detachable from A. M. Bedel recommends chains LL., but cords could be used.

THE USE OF PEAT MOSS LITTER.

By Veterinary Lieut.-Col. J. A. NUNN, C.I.E., D.S.O.,

Fellow of the Royal College of Veterinary Surgeons; Fellow of the Royal Society, Edinburgh; Deputy-Director-General Army Veterinary Department; Examiner in Hygiene, Royal College of Veterinary Surgeons; late Principal, Punjab Veterinary College.

Bedding of some sort for animals kept in a state of domestication has been recognised as a necessity from the remotest times, not only to protect him from the hard floor of his stable or shelter when he could no longer roam about and select the softest spot in the woods for himself, but to absorb the moisture and keep the place clean, also to protect him from the cold in the winter, as he was not able to withstand the weather in the way he could in his natural or wild state.

For centuries straw has been used for this purpose. The Romans employed straw for litter as well as fodder for sheep and oxen, but, contrary to our ideas, millet straw was considered as best for cattle, then barley, and last wheat. The same opinion exists in Northern India to this day, the hot climate making the barley straw dry and crisp, and the wheat straw too hard and dry from the quantity of silica it contains. The hulm of the various sorts of pulses were considered best for sheep. Straw was sometimes bruised on stones before being used as litter, which is analogous to having it cut with a straw cutter, and when it was scarce we hear that ferns, dead leaves, &c. were gathered. Varro says, "It is the opinion of some that straw is called "Stramentum" because it is strawed before the cattle.[1]

In bygone ages straw no doubt was used for litter as it was looked on almost as waste on the farm. It was bulky, there was little demand for it, roads were bad, rendering it expensive to move, and there were abundance of other crops for food and forage stuffs for the cattle, so no doubt the best and most economical plan of disposing of it was the conversion of it into manure through the process of first using it as bedding, otherwise the practice of certain

[1] Dickson's Husb. Anc. II., 407.

parts of America would have to have been resorted to of heading the ears off, and burning the straw standing.

This state of things existed up to about twenty-five or thirty years ago, and has lasted for so long that it has become firmly rooted in the minds of the ordinary farmer and stockowner," who is proverbially conservative and opposed to any new idea," that straw was the only substance that could be used for bedding, and furthermore, that this was its proper use.

About this time agriculture began to undergo changes, with the opening out of the country by railways and better roads, farm produce could be taken to distant markets at remunerative rates, and the price of straw went up, and later on foreign competition brought down the price of wheat so low that it did not pay to grow it, large areas of wheat land going out of cultivation. This and the demand for straw for other purposes, such as papermaking, set men thinking if its proper and only use was for bedding down animals, and it was discovered that in foreign countries straw was used for feeding purposes.

The value of straw as food for stock has not yet been fully understood by the general body of farmers. Of course when cheap and plentiful it can conveniently be converted into manure by using it as litter, but when hay is scarce it is more economical to feed it to the stock, and use something else for bedding. The value of straw of course depends on the species it is as well as the land and climate where it is grown, and the condition it is harvested in, strong coarse straw not being so good as a food as that of a finer growth. The following analysis are given by Vœlcker in the *Journal of the Royal Agricultural Society of England*, vol. xxii., 1862, and shows the relative value of the different sorts of straw:—

I.

	Wheat just ripe.	Wheat over ripe.
Water,	13.33	9.17
Albuminoids,	2.93	2.12
Oil and fatty matter,	1.74	0.65
Sugar, mucilage, &c.	4.26	3.46
Woody fibre (digestible),	19.40	82.26
„ (indigestible),	54.13	
Mineral matter,	4.21	2.34
	100.00	100.00

II.

	Barley dead ripe.	Barley not too ripe.
Water,	15.20	17.50
Albuminoids,	4.43	5.37
Oil and fatty matters,	1.36	1.17
Sugar, mucilage, &c.	2.24	
Woody fibre (digestible),	5.97	71.44
„ (indigestible),	66.54	
Mineral matter,	4.26	4.52
	100.00	100.00

III.

	Cut straw dried for stacking.		
	Cut green.	Fairly ripe.	Over ripe.
Water,	16.00	16.00	16.00
Albuminoids,	8.49	4.08	3.65
Oil and fatty matters,	1.57	1.05	1.25
Sugar and mucilage, &c.	16.04	10.57	3.19
Woody fibre (digestible),	26.34	30.17	27.75
„ (indigestible),	24.86	31.78	41.82
Mineral matter,	6.70	6.35	6.34
	100.00	100.00	100.00

IV.

	Bean straw.	Pea straw.
Water,	19.40	16.02
Albuminoids,	3.36	8.86
Oil and fatty matter,	1.02	2.34
Sugar, mucilage, &c.	4.18	8.32
Woody fibre (digestible),	2.75	16.74
„ (indigestible),	65.58	42.79
Mineral matter,	3.71	4.93
	100.00	100.00

The analysis shows that oat straw is of the highest feeding value; indeed in Scotland and the northern parts of England where oats are the prevailing grain crop; with a small proportion of roots or cake it is the chief winter food for young store stock and dry cows. Pea and bean straw have high feeding values, while, although lower on the scale, wheat and barley straw possess considerable value as food for stock. Indeed, in Egypt, Persia, and Northern India, barley straw is the only forage not only cattle but horses get. The grain is thrashed out by the primitive method of driving cattle over it when spread out in a circle on the threshing floor. The straw is broken into pieces about an inch long, and split up longitudinally by the hoofs of the oxen into what is known in Hindustani as "bhoosa," Egyptian "tibben," and is the chief forage that the horses and mules of the Punjab Frontier Force get, the country being very arid, little green grass grown, and hay unknown. During a number of years spent on the Afgan frontier I fed my horses entirely on "bhoosa," and have also kept milch cows and goats on it.

Under these circumstances thinking agriculturists began to consider whether it was not more profitable to use the straw as food, and set about to find a substitute to take its place as a litter. In towns and cities this also had been forced on the notice of horse-owners, as straw had become expensive, in many cases farmers being prevented by their landlords from selling it off their holdings.

A variety of substances have been suggested and tried for litter, viz., tan, sand, sawdust, wood shavings. fern, pine needles, &c., but the most satisfactory has been peat moss. When first introduced it was obtained from the extensive moors of Oldenburg, and was perhaps somewhat unfortunately put on the market as "German

peat moss," giving rise to a prejudice against it as being a foreign innovation, but since then this drawback has disappeared; a large proportion is now obtained from Yorkshire, Lancashire, Scotland and Ireland.

As is well known peat has been used in these parts of the country as a fuel from time immemorial, but the true value of the vast deposits that exist in our islands and the northern parts of Europe have only been recognised of late years, during which it has been used for a variety of purposes, amongst others a fibre having been obtained from it from which an exceedingly valuable surgical dressing, "petanelle," has been prepared that has largely taken the place of cotton wool as a dressing for wounds; also it has been manufactured into a clothing material which is particularly valuable from the inherent antiseptic properties of peat, and from the bog moss (*Sphagnum*) a soap has lately been prepared, which is said to allay the irritation of "eczema."

Peat is formed by the decomposition of certain water plants, more particularly bog moss (*Sphagnum*), in stagnant water, the lower portion of the plant decaying while new shoots are thrown out above. This process of decay goes on very gradually and can only take place in cold climates; in warm countries the changes that take place after the death of the plant are too rapid to allow of the formation of peat, but in the colder parts of the world this does not take place so rapidly, and the ponds and lakes are in process of time filled up and turned into bogs, being the first stage in the process of formation of coal. Other plants enter into the formation of peat, viz., cotton grass (*Eriophorium Angustifolium*), horse tail (*Equisetum*), bog myrtle (*Myrica gale*), besides sedges and heaths, but these are not desirable, and for bedding the moss formed out of bog moss is the best.

The process is something like that of the manufacture of charcoal out of wood, which is consumed slowly with only a very small supply of air, but in this case it first turns into peat moss; the second stage in the coal formation being lignite or brown coal, which is useless for bedding, being more formed, hard, and non-absorbent. Bloxam gives the following percentages of carbon, hydrogen, and oxygen:—

	Carbon.	Hydrogen.	Oxygen.
Wood, ...	100	12.18	83.07
Peat, ...	100	9.85	55.67
Lignite, ...	100	8.37	42.42
South Wales coal, . . .	100	4.75	5.28
Anthracite, ...	100	2.84	1.74

There are many varieties of peat, some consisting almost entirely of the withered remains of plants and mosses, which, except mechanically, have undergone little or no change, whereas in others there is no indication of plant structure remaining. The latter kind, which for soil is the most valuable, is black or dark brown in colour, and has a clayey consistency without any fibre. When dried it shrinks considerably and becomes denser than water, good

specimens having a specific gravity of 1·25. The former, which is used for litter, is light and spongy, with somewhat the character of compressed hay of a pale yellowish brown colour, very bulky, and absorbs a large amount of water. When dried its specific gravity is sometimes as low as 0·25. There are the two extremes, but between them are many intermediate samples.

The quantity of water contained in peat is always large, in the spongy variety as much as 80 to 90 per cent., and with air drying, as is used to prepare it for fuel, it cannot be reduced below from 15 to 30 per cent. of the dry material, but of course this can be greatly lessened by artificial means. Numerous experiments have been made to get rid of this water in an economical manner, as well as to overcome the hygroscopic or absorbent properties, and utilise it for fuel, and the result of these investigations has been to show the marked difference there is in the chemical composition of peat obtained from various sources.

The amount of ash, as will be seen by the tables, is exceedingly variable, and furthermore, the composition of the ash of different samples varies in a like manner. The ash rarely consists entirely of the mineral constituents of the plants that the peat is composed of, but a large portion is derived from earth mechanically mixed with the peat or mineral substances held in solution in the water and deposited in it. It is obvious, therefore, that the composition of the ash will be largely determined by the nature of the rocks in the vicinity of the peat-bogs, or such constituents of them as are conveyed into the peat either mechanically or chemically by the action of the water. The water no doubt also exercises a further influence on the composition of the mineral constituents of peat by abstracting certain of them either by chemical action or the process of dialysis. The composition of the peat ashes and the nature of the changes they have undergone would therefore be mainly determined by local conditions, and this may to a considerable extent account for the great variations that exist between different samples.

When peat that has previously been air-dried is exposed to a temperature of 100° centigrade, it loses from 15 to 30 per cent. of its weight, chiefly consisting of water that has been absorbed, but, according to Marsilly, even at this temperature, decomposition takes place, and volatile products containing carbon and hydrogen are given off in small quantities, while at a higher temperature it is completely decomposed, giving off gas tar, a watery liquid, and carbonaceous residue, the ordinary products of dry or destructive distillation. These products in their general characteristics are intermediate between those obtained under similar conditions from wood, and from bitumen, both in amount and chemical composition; but this also depends on the temperature they have been exposed to. These products of distillation of peat furthermore vary both in quantity and quality, according as the peat more approaches wood or coal, in the same manner as there are similar differences between the products obtained by distillation from different bituminous minerals.

The chemical nature of the change by which peat has been produced from plant remains is probably very similar to that by which bituminous minerals have been produced from similar materials. It consists chiefly in the removal of oxygen and hydrogen in the proportion to form water, of oxygen and carbon in the proportion to form carbonic acid, and of hydrogen and carbon in the proportion to form marsh gas, the main feature of this change being the increase in the amount of carbon in the residual substance. Hence the composition of different kinds of peat varies in proportion to the extent to which this alteration may have advanced, and peat which has been little altered will possess a composition more or less resembling that of ligneous tissue or wood, while those kinds that have undergone greater alteration will possess a composition approximating more to that of coal, lignite, or other bituminous minerals, according to the conditions under which this change has taken place. The physical character of peat, such as texture, colour, density, &c. also bear a similar relation to the degree of chemical alteration which has been reached, the fibrous light-coloured spongy kinds being almost similar to wood in composition as well as most unlike coal or lignite, while, on the contrary, the compact dark-coloured dense varieties of peat often resemble lignite, and some kinds of coal in composition, as well as their physical characters. It is indeed probable that peat may be regarded as a sort of intermediate product of the same general mode of alteration, by which coal and other bituminous minerals have been formed, and if deposits of peat were placed under conditions such as those in which coal, &c. have been produced, the peat might in process of time be converted into coal.

COMPOSITION OF PEAT (Watt's *Dictionary of Chemistry*).

Locality from whence Peat Moss obtained.	Specific Gravity.	Water in Air-Dried Peat.	Percentage composition of Peat dried at 100° Centigrade.					
			Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ash.	Authority.
Cappoge, Ireland, .	—	—	51·05	6·85	39·55		2·55	Kane.
Kilbeggan, do. .	—	—	61·04	6·67	30·46		1·83	,,
Kilbaba, do. .	—	—	51·13	6·33	34·48		8·06	,,
Phillipstown, do. .	0·405	—	58·69	6·97	32·88	1·45	1·99	Sullivan and Gages.
	0·669	—	60·48	6·10	32·55	0·88	3·30	,,
Wood of Allen, do.	0·335	—	59·92	6·61	32·22	1·26	2·74	,,
	0·639 to 0·672	—	61·02	5·77	32·40	0·81	7·90	,,
Devon, . . .	0·850	25·56	54·02	5·21	28·17	2·30	9·73	Vaux.

Locality from whence Peat Moss obtained.	Specific Gravity.	Water in Air-Dried Peat.	Percentage composition of Peat dried at 100° Centigrade.					
			Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ash.	Authority.
Island of Lewis, .	1·130	23·20	60·00	6·90	30.00	1·30	1·90	Paul.
Brésles, . . .	—	2·17	46·80	5·65	47·15		6·40	Marsilly.
	—	3·14	47·48	7·16	36·06		9·00	,,
Thesy, . . .	—	3·07	50·67	5·76	36·95	1·92	6·70	,,
	—	7·20	43·65	5·79	36·66		14·00	,,
Bourdon, . . .	—	5·55	47·69	6·01	39·30		7·00	,,
Camon, . . .	—	5·59	46·11	5·99	35·97	2·63	9·40	,,
Riemencourt, . .	—	1·81	12·99	2·22	19·31		65·01	,,
Vulcaire, . . .	—	—	57·03	5·63	29·67	2·09	5·58	Regnault.
Long, . . .	—	—	58·09	5·93	31·37		4·61	,,
Framont, . . .	—	—	57·79	6·11	30·77		5·33	,,
Friesland, . .	—	—	57·16	5·65	33·39		3·80	Mulder.
	—	—	59.86	5·52	33·71		0·91	,,
Holland, . . .	—	—	50·85	4·65	30·25		14·25	,,
Rammstein, . .	—	16·70	62·15	6·29	27·20	1·66	2·70	Walz.
Steinwenden, . .	—	16·00	57·50	6·90	31·81	1·75	2·04	,,
Niedermoor, . .	—	17·00	47·90	·80	42·80		3·50	,,
Prussian, . . .	—	15·70 to 21·70	50·13	4·20	31·44		8·92	Baer.
	—		55·01	5·36	35·24		11·17	,,
Havel, . . .	—	17·63	56·43	5·32	38·35		9·86	Jaekel.
	—	19·32	53·51	5·90	40·59		6·60	,,
	—	18·89	53·31	5·31	41·38		6·80	,,
Linum, . . .	—	31·34	59·43	5·26	35·31		11·99	,,
Hamburg, . .	—	18·83	57·20	5·32	37·56		2·31	,,
Bremen, . . .	—	—	57·84	5·85	32·76	0·95	2·60	Breuninger.
	—	—	57·03	5·56	34·15	1·67	1·57	,,
Schopfloch, . .	—	20·00	53·59	5·60	30·32	2·71	8·10	Nessler and Petersen.
Sindelfingen, . .	—	18·00	45·44	5·28	26·21	1·46	21·60	,,
	—	18·00	38·72	4·24	25·89	0·88	30·60	,,
Baden, . . .	—	11·77 to 18·55	46·75	3·57	25·87	0·67	0·89	,,
			60·79	7·10	49·01	6·33	14·76	,,

ANALYSIS OF PEAT ASHES (Watt's *Dictionary of Chemistry*).

	Dutch.	Scotch.		American.		Bavarian.	Irish.	
Authority.	Anderson.			Johnson.		Wagner.	Sullivan and Gages.	
Soda, . . .	1·1	1·0	—	0·6	—	0·3	0·679	1·427
Potash, . .	1·2	0·7	0·4	0·7	0·8	0·7	0·347	0·362
Magnesia, . .	4·5	0·4	—	6·0	4·9	0·9	1·256	3·392
Lime, . . .	·7	1·2	1·3	40·5	35·6	11·2	45·581	26·113
Alumina, . .	2·9	—	1·8	—	—	28·4	0·129	4·180
Ferric Oxide, .	5·3	30·7	12·5	5·1	9·1	4·5	15·974	11·591
Phosphoric Acid,	—	—	—	0·5	0·7	0·9	0·188	1·461
Sulphuric Acid, .	9·7	5·5	2·0	5·5	10·4	2·6	44·371	12·403
Chlorine, . .	1·5	—	0·1	0·1	0·4	trace.	H.Cl. 0·337	1·568
Silica, . . .	9·8	—	81·6	8·2	1·4	12·3	1·043	0·980
Carbonic Acid, .	—	—	—	—	—	1·0	16·120	13·695
Sand, Clay, &c. .	51·5	60·6	—	31·7	37·3	37·2	2.653	22·519
							99·678	99·691

There was a vast amount of opposition to the use of peat moss litter when first introduced; in certain cases no doubt partly justifiable, as many samples in early days were bad, either containing remains of other plants besides "Sphagnum," or else being too far developed into "Lignite"; it was also thought that it could only be used for horses, other animals, such as milch cows and pigs and dogs never being considered, and this prejudice still exists in many quarters, although it is slowly giving way.

No doubt, to the eye its dark colour is not so attractive to one used to the bright appearance of fresh straw, and it gives the stable a somewhat cold look, but this is altogether a matter of appearance that one can get accustomed to. A much more real drawback were complaints that it rotted the hoofs and made them soft and easily broken, but this was proved to be due to ignorance as to its use or neglect. Peat moss possesses powerful absorbent properties, especially for ammonia, and, as is well known, ammonia dissolves horn. Owing to the disinfectant properties of the moss, the characteristic smell of ammonia was not noticed by the groom, and the damp peat moss was not changed. He furthermore forgot that it was composed of short pieces that would stick in the hollow of

the feet, and forgot to pick them out. I have kept horses on peat moss for weeks together and have never found any injury caused to the feet if the wet foul moss is changed and they are properly picked out. It is the ammonia, not the moss, that destroys the hoof, and with proper stable management this should not take place.

I have heard complaints that horses eat peat moss, and no doubt it is possible. I can only relate my own experience, viz., that I have never yet met a case, whereas I have seen many that will eat straw, sometimes even in preference to hay.

It is said that the short moss will get into the coat and dirty the horse, but this may be a certain advantage, as a lazy groom will have to thoroughly do him over to get it out, and the owner can see if his servant has been working.

Against these drawbacks, many of which are imaginary, are many undoubted advantages. The first and most important in the eyes of the owner of a large stud of working horses, or farmer with regard to cattle, is economy—the present cost of peat moss being about 30s. per ton against about 50s. for straw. For a box 12 feet by 11 feet about five bundles or 70 lbs. of straw will be required to make a comfortable bed and 7 lbs. per diem to keep it up = 1s. 7d. for initial outlay and 2d. for upkeep. With peat moss for a box the same size about 2 to 3 cwt. will be required to make the bed and 6 to 7 lbs. daily for upkeep, or 3s. 9d. for initial outlay and 1d. for upkeep, so that after first cost moss litter as a bed effects a saving of 50 per cent. as against straw. For an ordinary-sized stall the amount of both straw and peat moss for the bed and upkeep would be about half these quantities. Furthermore, the value of the manure must be remembered. In many towns there is difficulty in getting ordinary green stable manure removed, as it is of little value to put on the land until it has become rotten. This in most places it is impossible to do, as in London; the size of manure receptacles is fixed by the Public Health Authorities and they have to be emptied at least every forty-eight hours.

This is not the case with manure formed with peat moss. The manager of the Leicester Tramways says—"Before using peat moss litter we had a difficulty in getting rid of our manure. We now frequently have to send customers away with empty waggons. Demand greater than supply. In 1896 the manure from our stables realised £318 : 7 : 4 and the cost of moss litter for the same period £249 : 9 : 11—actual profit, £68 : 17 : 5." A writer in the *Financial News* of May 7, 1903, calculates that the use of peat moss in the army would mean a saving of £1 per horse per annum to the nation.

In certain cases of sickness, peat moss is preferable to straw for litter, apart from its disinfectant properties. Being short, it does not interfere with the feet when an animal moves round in his box, like long straw is apt to do, which in certain cases of injuries to

the limbs and lameness, is a distinct advantage: it is also noiseless, which is a most important point in the successful treatment of a case of tetanus.

In the treatment of sick animals its disinfectant properties are valuable. It is at times impossible to groom animals or properly keep them clean, the stable, cow-shed, or kennel is likely to get very insanitary, and the use of powerful disinfectants is repulsive to the patient: for this reason alone peat moss is used in many infirmary stables instead of straw, altogether apart from motives of economy, and in kennels for the additional reason that vermin do not remain in it.

From a hygienic point of view, the special advantages of peat are its powers of absorption, particularly of ammonia, and no one can avoid being struck with the difference in the atmosphere in an ill ventilated stable on going into it in the morning, when peat moss and straw have been used as bedding; in the one the air is comparatively speaking pure, in the other, the well-known irritating effects of ammonia are apparent. Peat moss in its earlier stages of formation has the greatest absorbent properties; when it commences to turn into lignite it becomes solid, hard, more of the nature of coal, and useless for purposes of bedding.

It should consist as much as possible of fibre, and not contain much earthy matter, which inferior moss from old-formed bogs does. Good moss for bedding should only contain 15 per cent. of water and 4 per cent. ash. A good plan to test it is to heat it on a shovel over a fire, and allow it to smoulder away; it should leave a light powdery ash like wood ashes, that can be blown away; if there is an excess of earth, being heavy, it will remain behind.

The presence of a large proportion of earth not only reduces its absorbent properties, but when it gets damp from the urine dissolves out and forms mud on the floor; it also gets powdered and broken up by the animals' feet, and if it does not get damp creates a lot of dust, which for the time being spoils the appearance of the coat,—indeed it is said to spoil the gloss of the coat when it comes in contact with it.

Its natural disinfectant properties are well known, containing as it does a large proportion of humic and other acids, and it not only absorbs ammonia, but appears to decompose it and prevent the fumes rising, so that instead of decomposing as straw does in the presence of excrements it appears to disinfect them.

M. Chardin (*Hygiene du Cheval de Guerre*, Asselin & Houzeau, Paris) states that he has made the experiment of putting straw and peat moss in water in separate vessels. After the lapse of five or six days the straw had a strong smell of putrification, but the peat moss was perfectly sweet after a fortnight. The same observer states that straw will only absorb its own weight of urine, but peat moss will effectually absorb 3 to 3½ times. It will, however, he says, take up a great deal more,—ten times its weight,—but it then becomes damp, sodden, unfit for use, and should be changed.

MM. Muntz and Girard have concluded an elaborate series of experiments into the amount of water various sorts of litter will absorb, and give the following. They are the average of a number of different experiments, as, of course, it depends on the dryness of the substance and how finely it is divided.

	Number of litres of water absorbed per 100 kilogrammes.	Weight that absorbs the summum equivalent of water, or 100 kilogrammes of wheat straw.
Wheat straw, . . .	220	—
Barley, ...	285	77
Oat, ...	228	96
Pea hulm, . . .	280	88
Bean straw, . . .	330	67
Rape hulm, . . .	200	110
Heath, ...	145	150
Fern, ...	212	100
Moss, ...	275	80
Furze, ...	111	200
Dead leaves, . . .	200	110
Pine leaves, . . .	200	110
Turf, ...	600	40
Sawdust, Scotch fir, .	420	50
Do. Poplar, . .	435	50
Tan, ...	500	48
Light mould, . . .	50	440
Chalk, ...	40	550
Sand, ...	25	880

Hygiene des Animaux Domestique, H. Boucher, page 215.

The same observers state that peat moss will absorb six and a half times as much ammonia as wheat straw, and twenty-four times as much as pine sawdust.[1]

Captain Hayes ("Stable Management and Exercise") remarks, concerning Muntz and Girard's table, that their sample of peat moss must have been a bad one, and that a good specimen will absorb eight to ten times its weight of water.

As regards the comfort of the animal, the absorption of ammonia need hardly be mentioned, indeed the contrast in the atmosphere of a stable where peat moss is used and one with straw is apparent to any one if they go into it when first opened in the morning. In cow-houses this is almost more noticeable than in stables, and is most important, especially when, as is usually the case, the cows are milked in their stalls. Milk, as is well known, is most susceptible to change, and to expose it to an atmosphere reeking with ammonia and exhalations from excrement is, to say the least of it, not a cleanly process or pleasant idea, even if it is not positively deleterious. In underground stables in towns the absorbent properties of moss litter are especially valuable. In such places in which, for necessity, animals are kept, ventilation is always a vexed question, and even with the most perfect appliances

[1] *Hygiene des Animaux Domestique*, H. Boucher, page 215.

the atmosphere is always somewhat vitiated, which is increased by the presence of a considerable amount of ammonia in the air, which, if absorbed, will render such places much more sanitary for the animals living in them, and the same applies to the pit ponies employed in mines, the managers of several of which on the Continent have adopted this system of bedding with good results.

The bed peat moss makes is cool, elastic, and soft, and being springy under the feet, animals like it; in fact, it has been found that when horses are left loose and they have their choice, that they prefer it to straw, and there are cases recorded that animals will lie down on one when they will refuse to lie on the other. The bed is more level and even than straw, and on a rough, uneven floor, such as one paved with cobble stones, the interspaces can be filled up better, and the danger of injury from rolling on projecting bricks, &c. avoided, and in the summer time flies are not attracted as much as they are by straw.

The chief drawback to moss litter is that it is said to heat and rot the hoofs, but this will take place in any case if animals are allowed to stand in urine. When first introduced its management was not properly understood, and the necessity of renewing it when damp was not realised, but with a little extra care in picking out the feet this objection is overcome. Careless grooms are likely to leave it till it gets damp and sodden, which, owing to its dark colour, is not easily detected, and this will stain both the coat and clothing if horses lie down in it. On the other hand, if it is kept clean, grey and light-coloured horses do not stain so readily as with straw.

Its good qualities, in addition to those already discussed, are portability and easy storage, being made up in compressed bales, and safety from fire, certain insurance offices accepting lower rates when it is used,—in addition to its value as a manure, which point will be entered into more fully further on,—and that it does not harbour rats and mice.

For the removal of urine and other liquids the different sorts of bedding acts on two directly opposite principles, and failure to grasp these differences was one of the chief causes why peat moss was in its earlier days condemned. Straw of any sort acts as a drain, the liquid being carried along it and run off out of either the stall or box, each individual straw acting as it were as a drain-pipe. This drainage action can be greatly increased if care be taken to spread the straw out so that the individual ones shall lie as nearly parallel to each other as possible, instead of throwing them down in a tangled mass and beating them flat with the stable fork. With the one plan the individual drops of liquid are all conveyed in the same direction, *i.e.*, towards the drain, in the other they are not.

Peat moss, tan, sand, and sawdust act quite differently by absorption, the fluid not being conveyed away, but retained. How much can be taken up depends on the powers of absorption of the

particular substance as shown in Muntz and Girard's tables, but peat moss possesses it in a high degree. Of course, in no substance can this power of absorption be carried on indefinitely; when a certain variable amount has been taken up the substance becomes water-logged and sodden, and the contained fluid must be got rid of by evaporation, pressure, or other means, before it is fit for further use. In the case of water this can be done, and is frequently made use of, but although the watery constituents of urine are readily removed the solid portions remain behind, and would in time clog up the pores of the substance converting it into a hard earthy mass. Before this, in practice, however, the solid matters would putrify and render the material unfit for use. This system of absorption not being understood, peat moss was left on the floor, under the supposition that the fluids would be drained off like straw, and not changed, the result being that the whole bed got into a most foul state, and the system generally was condemned. Even at the present day this absorbent system is not properly understood, so much so, that a cavalry officer in a work on stable management published in 1896 says: "Moreover, it is the most dreadful stuff to use in a stable, as, without the greatest care being exercised, *it very soon stops up the drains*, and so is a source of constant expense and inconvenience, the smaller particles get washed down with the water, and, settling in the drains, swell and so block them."

With absorbent bedding drains are not only not necessary but useless. During the South African war a remount depôt, usually containing some 200 or 300 horses, was established in the Southampton Docks in one of the large iron goods sheds hired from the company. Having been constructed for warehouses, there was no drainage, and difficulty arose on this point, which was overcome by adopting the absorbent plan, in this instance sawdust being used, as it was in this particular locality cheap and easily obtainable. The plan answered well, and during the time the depôt existed there was no complaint on sanitary grounds. Of course, in this instance, there was plenty of labour, and the system being explained, those in charge carried it out in an intelligent manner. Indeed, when this system is used, it is better to stop the drains up altogether if they are subsoil ones.

Peat moss, being so very absorbent, will readily take up moisture from the air. It should be kept in a dry place in the original bales till required for use, but if any have a musty smell about them, which is not infrequent, they must be opened out and dried.

When first put down the bed should be two to three inches thick, for the animal's weight will tend to consolidate it, and for this reason it should be raked over two or three times a day. The bed can be swept up at the sides of the stall or box and aired daily, but it seldom requires to be entirely renewed, if care be taken to remove the damp and soiled portions and put fresh down

as quickly as possible. The soiled portions, if dried, can be used under cattle, and then re-used for pigs before it goes to the dung-heap. The absence of smell when it is used in a piggery is most remarkable, and particularly noticeable by any one who has not had practical experience of it, and a greater economy and more valuable manure obtained than from straw in a smaller bulk, which is important when near human habitations and for transport purposes.

The dark colour of peat moss no doubt gives a somewhat cold look to the stable when the eye is unaccustomed to it, and gives rise to a certain amount of prejudice, but this can be overcome by putting a layer of straw over the moss, which will remove the cold appearance.

The writer of the article, "A Matter for the War Office," in the *Financial Times* of May 7, 1903, enters fully into the economy that would be effected by its use in the Army, but on the few occasions it has been tried prejudice has been too great, and it was condemned on account of the difficulty in attending to it.

As a manure peat moss is valuable, indeed some practical agriculturists say that a ton of it is equal to at least three tons of good rotten straw manure, and it is peculiarly rich in phosphates and ammonia.

Composition of Farm-Yard Manure.

	Straw Litter.	Moss Litter.
Moisture, ...	75·42	62·53
Organic matter, ...	16·53	29·14
Phosphate of lime (total phosphates), .	·96	2·56
Alkaline salts (with potash), . . .	4·43	3·60
Insoluble matters, ...	2·66	2·17
	100·00	100·00
Containing nitrogen, ...	·61	1·24
Equal to ammonia, ...	·74	1·50

It should be remembered that moss litter can only be compared with ordinary farm-yard manure; it would be unreasonable to contrast it with the highly concentrated and artificially prepared fertilisers that are on the market.

When finished with as bedding it can be thrown on the dung-pit or into the straw yard for the cattle to run on, but the best plan is to put it in heaps, water it with liquid manure, and then cover it with either fine earth or ashes. It will thoroughly rot in about two months and is then valuable for gardens, a ton treated in this fashion being equal to seven of ordinary straw. It has the advantage of having no long straws to dig in, the heap having turned into a sort of a compo. When peat moss was first introduced into France there was much opposition to the use of it as manure, it being said to be useless for growing vegetables. As large quantities were brought out from Paris, its disposal became a matter of some importance, and MM. Muntz and Lavalard made some inquiries on

behalf of the Paris Omnibus Company regarding its use to market gardeners in the vicinity of the city, and proved that this idea was a fallacy, and, in fact, that it was superior to ordinary manure.

Two equal sized plots of land were dressed one with moss litter and the other with straw manure, the same crop grown, with the following result :—

	Beetroots.	Wheat.
Straw manure, .	30·000 kilogrammes.	1·033 kilogrammes.
Peat moss manure,	44·060 „	1·234 „

These observations of MM. Muntz and Savalard have been confirmed by other observers, and this manure is now in favour with the gardeners round Paris.

Clinical Papers.

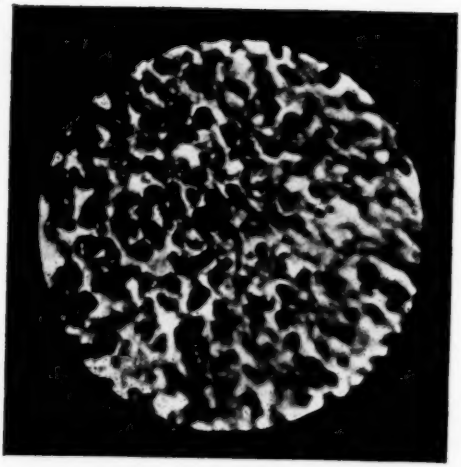
TUBERCULAR DISEASE OF THE SPLEEN OF A HORSE

BY HENRY THOMPSON, M.R.C.V.S., ASPATRIA.

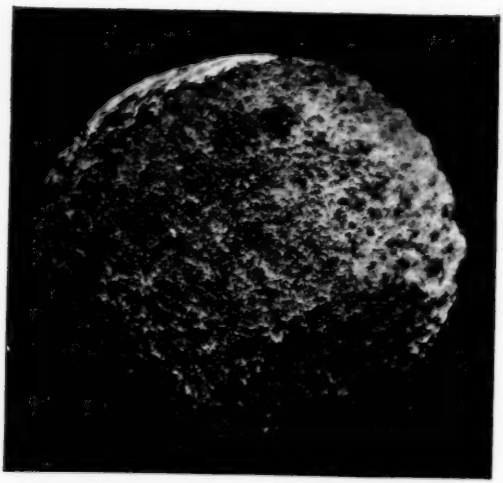
WITH the following particulars of a case that has lately been under my care I herewith send you two photos taken by my son Charles Thompson of the attached and free sides of the spleen of a horse ; the length of the organ was 25 inches, and the different breadths were 13 inches, 9 inches, and 3½ inches respectively. It will be seen from the photos that both sides are well studded with large deposits, while numerous small ones can be observed on the surface ; these small nodules were plentiful all through the substance of the organ. These deposits, on microscopic examination by Principal Williams, of the New Veterinary College, Edinburgh, are found to be of a tubercular character. As this is only the second case of tuberculosis that I have met with in the horse, I thought it might be of some interest to your readers. My first case was that of tubercular disease of the lungs of a miller's horse, and was at the time recorded in the VETERINARY JOURNAL, when my old and ever revered friend the late Principal Williams made a microscopic examination of portions of the lungs, and found the tubercular bacilli, which was much larger than the bovine bacilli.

The history of the present case is as follows :—The subject was an aged chestnut waggon horse, and it is about six months ago since he was first noticed to be looking rather dull and not taking his food as hearty as he was prone to do, and as he grew gradually worse I was requested to see him. On examination I found his breathing normal, slightly tucked up in the flank, the coat good, pulse natural, no fœtid breath or cough, visible mucous membranes of a nice pink hue, no rise in temperature, his fæces were extraordinarily dry, and passed in small, dry, hard pellets ; this latter all through was a great feature in the case. As there were no positive or negative symptoms to be found as to what was the nature of the case, I ordered a course of general tonic medicine, and commenced with powdered aloes, exsiccated iron, and powdered nux vomica, of each one drachm, made up into a ball with common mass, and although these balls were given daily for a fortnight no apparent effect was noticed in the nature of the fæces—they still remained hard and dry. The treatment was frequently changed, —arsenic in four-grain doses daily for a fortnight was tried. Iodine

TUBERCULAR DISEASE OF SPLEEN. (Page 194.)



MELANOSIS. (Page 197.)



VESICAL CALCULUS. (Page 199.)

and iron were also given. Alkalis such as bicarbonate of potash and soda combined with vegetable tonics were also used. Hyposulphate of soda was offered in drinking water, but was very rarely taken as the horse had little or no thirst, and drank very little. The appetite was tempted with all sorts of food, such as green grass, thorn shoots, chopped gorse, raw potatoes, carrots, and turnips (these latter were relished the most), boiled barley, malt, cod liver oil, and milk, &c. &c. were offered, but all to no purpose. When any fresh food was put before him he started to eat almost ravenously, but after about half-a-dozen mouthfuls he would stop all of a sudden with his mouth full of food, and stand in a quiet thoughtful position, holding his head as if he was listening for some sound. The symptoms throughout varied very little, and the horse gradually grew worse and lost flesh rapidly, and the clicked-up belly became more pronounced. He could walk steady and straight, and never at any time showed the least sign of reeling or staggering from side to side. Three weeks ago I was wired for to go and see him again, as a great change was noticed. On arrival I found him breathing much quicker—thirty to the minute, pulse 86, nostrils dilated, temperature 104. After carefully examining him over I told the owner to put him down, as he was going to do no good. He was accordingly shot, when, with the exception of the spleen, all the organs of the body were normal, only the lungs, although healthy looking, were much enlarged (hypertrophied), the spleen was in the condition as shown by the photos, and studded all over with large tubercular deposits. I forwarded the spleen to Principal Williams, the New Veterinary College, Edinburgh; possibly he may supplement these remarks. I may here mention, some years ago I had a case of splenic disease where the animal lingered on for about six months, but in this case the pulse were always quick and soft, coat hard, the mucous membranes of mouth, nostril, and eyelids were deathly white, while the horse could not walk steady, but reeled from side to side, and if he came down he could not rise without assistance, and was for the greatest portion of the time supported on slings, and although he fed well he gradually lost flesh, and was finally put down.

The post-mortem of this case showed an enlarged spleen, studded all through with tumours varying in size and resembling very much a Spanish onion of a pale blue-white pearly hue, and made up of concentric layers, like that of an onion. This I have always considered a true case of "Lymphadenoma." The tumours were not examined microscopically, but were of quite a different character than those in the present case, and, if I may venture an opinion, there is a great difference of the symptoms and of the post-mortem of lymphoid deposits in the spleen and that of tubercular deposits in that organ.

[I have made a careful microscopical examination of portions of the spleen neoplasms, and found them to be crowded with the tubercular bacilli.—Ed. *V. J.*]

INTERESTING AND OBSCURE INTESTINAL CASE IN A MARE.

BY H. G. BOWES, F.R.C.V.S., LEEDS.

The subject of this note was a van mare five years old, used in a light wherry, which came under my notice last winter. The history of the case was very simple—loss of appetite.

I first saw her on November 22nd, 1902, when I was told that she had not been eating well for some time, but had otherwise shown no sign of illness; I naturally examined the teeth and found them rather sharp, so rasped them and expected to hear nothing more of her.

I did not see her again for six or seven weeks, when I was again called in to her and found that she had picked up a little after rasping her teeth, but that she had again almost completely lost her appetite. I this time made an exhaustive examination but could find no symptom whatever of any diseased condition; there was, however, a little soreness of the gums on either side of the lower jaw, where two small tushes were making an appearance, so I lanced the gum over them in the hope that they might have something to do with the mare's loss of appetite, and I left the horse-keeper some tonic balls to give her. After this, during the next two months, I saw the mare at odd times but could find no improvement, and what was more annoying could not satisfy myself as to what was wrong with her.

At this time, in the absence of any positive symptoms, I relied on the negative symptoms, and concluded there were probably bots in the stomach, and acting on this conclusion gave various vermicides, as turpentine and oil, ex. felicis maris, santonin, &c., but all to no purpose. I carefully examined the dung after the administration of these medicines but could find no sign of bots, and I might also mention that the dung appeared perfectly natural—what there was of it—and there was no appearance of catarrh about it nor presence of any sloughs in it, though in the light of after events, as revealed by the post-mortem examination, such might have been expected to be present.

To cut a long story short, the mare eventually died—no doubt from starvation. She was found dead in the stable on the morning of March 10th this year.

Post-mortem.—As soon as I heard she was dead and had gone to the knacker's, I proceeded there to make a post-mortem, satisfied that at any rate the cause of this mysterious illness would be revealed to me at last.

The seat of the trouble I soon found to be the bowels, which were very pale and anæmic—but this I presume was simply the result of starvation—and the small bowels were beaded, being alternately dilated and constricted.

Before opening the intestine I also saw several enlargements varying in size—the largest being almost as big as my closed fist—showing through the outer coats of the ileum. On slitting up the intestine these proved to be large ulcers, the large one already mentioned being quite 3 or 4 inches in diameter.

In addition to these large ones there were other small ulcers scattered along the course of the small bowel, but mainly in the ileum, and there were one or two small ones in the cæcum. The walls of the intestines in the region of these ulcers were also much thickened.

I have greatly regretted since that I did not bring portions of these ulcers away with me for microscopic examination, as it would be interesting to know what was their nature—whether tubercular or what. To me the case was unique; I do not remember ever having seen a similar one.

The remarkable feature of the case was that during life there were absolutely no symptoms of disease except loss of appetite. One would have thought that there would have been some symptoms of intestinal trouble;

certainly one would expect to find some indication in the dung, either by the presence of ulcerated tissue or even the presence of diarrhœa, but nothing of the kind existed.

MELANOSIS.

BY T. MARRIOTT, F.R.C.V.S.

SUBJECT—Grey mare, seven years old, sold at Tattersall's as a good polo pony. Returned within the specified time for defective eyesight.

This pony was then purchased privately by an officer of the Second Provisional Regiment of Hussars, who asked me to examine the pony and advise as to the treatment of two very unsightly melanotic tumours. On examination I found in the off eye a melanotic tumour $\frac{3}{8}$ths of an inch in diameter occupying the postero-inferior portion of the anterior chamber. In the near eye there was no visible tumour, but the lower margin of the pupil was so dragged down in the centre as to give the pupil a triangular appearance.

Near side, on the parotid gland, was a melanotic tumour the size of a walnut, which had ulcerated and become adherent to the skin. On the off side, situated on the parotid gland, was a large tumour about 6 inches by $2\frac{1}{2}$, reaching to within 3 inches of the base of the ear.

On explaining the risk attending the removal of this tumour, the owner decided to leave it until the close of the polo season. The small one on the near side was removed at once.

The end of July the pony was sent to hospital to have the off-side tumour removed. Casting the animal on the near side and cutting down upon the tumour, I proceeded to carefully dissect it out. All went well until detaching the superior extremity of the tumour, where being so intimately blended with a fairly large vein, the latter was punctured and was not too easily picked up and securely ligatured. Two or three other small vessels had to be ligatured ere the tumour was completely dissected out. Antiseptic dressing was applied and the lips of the skin wound brought together by interrupted sutures, drainage being effected by the ligatures on the vessels hanging out through the wound.

The following day there was but slight swelling and just a drop or two of saliva escaped, owing to a few minute portions of the salivary gland being imprisoned by and removed with the tumour. This discharge daily became less, and on the tenth day the ligatures sloughed off. With the exception of the drainage orifices the wound healed by first intention.

On examination this tumour was found to be a collection of sixteen tumours more or less intimately connected. Frozen sections cut the same day were not a success, as most of the cells were washed out. After hardening I cut some very good sections, which under a $\frac{1}{6}$th shows a connective-tissue stroma and round cells distributed singly throughout its structure. This would appear to be the exception, as most of the literature on the subject states that spindle-shaped cells predominate as a rule. Both cells and intercellular tissue are so thoroughly impregnated with pigment that staining the section has no effect. Through the kindness of Mr. Burgess, at the Jenner Institute of Preventive Medicine, I am able to forward herewith a micro-photograph of the sections as seen under a $\frac{1}{6}$th.

SAND COLIC.

BY HENRY TAYLOR, M.R.C.V.S., NEW VETERINARY COLLEGE, EDINBURGH.

COLIC caused by eating sand is more frequently seen in India, I believe, than in this country, but within the last two years I have had a couple of bad cases due to horses licking sea sand to obtain the salt in it. A large quantity of the sand used for building purposes in Edinburgh is obtained from the seashore at Portobello, and the horses sometimes lick the sand whilst the carts are being loaded. Moreover, they sometimes, when travelling along the road behind a cart loaded with it, lick it off.

The symptoms in both cases were those of acute enteritis—viz., constant pain, very much reddened mucous membranes, cold extremities, temperature about 103°, hard wiry pulse from 60 to 80, and abdominal muscles tense.

In both cases the pain did not diminish much for two days, and the animals were not fully recovered for a week. The treatment was chiefly hypodermic injections of morphia.

PARASITIC CYST IN THE WALL OF A COW'S HEART: SUDDEN DEATH.

BY HENRY TAYLOR, M.R.C.V.S., NEW VETERINARY COLLEGE, EDINBURGH.

MR. HOWATSON, M.R.C.V.S., St. Asaph, recently sent to the college the heart of a cow with the following history:—"The cow was six years old, due to calve in a few days, in good condition, and thriving. She was taken suddenly ill in the byre whilst the other cows were being milked, and died in less than five minutes after first being noticed to be ill, the symptoms pointing to choking." Mr. Howatson made a post-mortem examination and found a "membrane" entangled in the auriculo-ventricular valves of the left heart: he thinks the membrane must have been bladder-like, and that he cut into it (the bladder) when incising the left ventricle, for a small quantity of clear fluid escaped: both auricles and ventricles were quite empty, with the exception of this fluid. On examining the heart I found that the cyst had been attached to the heart-wall just above the large columna carnea, and had extended into the heart-muscle for a depth of about 1½ inches: part of the cyst wall was still attached here. On examining the cavity more closely I found two small cysts (about the size of a Barcelona nut if they had been fully distended) loose in the interior: they must therefore have been daughter cysts enclosed within the first large one. These two small cysts each contained a few drops of a clear fluid, and to the naked eye presented little spots similar to what one sees on an echinococcus cyst wall. Under the microscope, however, the spots looked degenerated, and I could find no hooks nor any well-defined heads. The large cyst must have been about the size of a goose's egg when full of fluid.

It seems quite reasonable from the above to assume that this was an echinococcus cyst, and that somehow or other it burst and interfered with the valves, causing sudden cessation of the heart, and death.

VESICAL CALCULUS: REMOVAL, RECOVERY.

BY VETY.-MAJOR J. BRODIE MILLS, INDIAN CIVIL VETERINARY DEPARTMENT, J.P., FELLOW BOMBAY UNIVERSITY, PRINCIPAL GOOT VETERINARY COLLEGE, BOMBAY.

THE following case came under my care some time ago at this College, and is, I think, worthy of record. The subject was a bay-waler gelding which had been purchased from a recently imported shipment from Melbourne. When put to work he gave evidence of pain in the region of the bladder, and sweated profusely, and on his return he always passed very high-coloured urine, tinged with blood, in small quantities and often, and would stand straining for a considerable time in the attitude of urination. During rest the urine contained little or no blood. The appetite was good and temperature normal. A rectal examination revealed the presence of a calculus in the bladder.

With the consent of the owner the patient was put under the influence of the A. C. E. mixture, and lithotomy performed. The catheter was passed, and an incision made about $1\frac{1}{2}$ inches below the anus, making an opening into the urethra large enough to pass the forceps. The calculus was grasped without much difficulty, and removed by gentle traction. The bladder was now thoroughly washed out with warm boracic lotion to remove any fragments of the stone which might have remained. The perineal wound was closed and dressed with iodoform, and a large loose pad placed over it. Urine was passed for some days through the wound, but this gradually became less and less in quantity, and on the twenty-second day after the operation, ceased entirely, when all the urine was passed through the usual channel. The healing process was satisfactory from the first, and the wound had completely closed, leaving only a very small cicatrix, by the thirty-fourth day. With the exception of a rise of temperature for a few days, ranging from 101·6° F. to 102·6°, and a disinclination to feed, there were no symptoms to cause the slightest anxiety. On the forty-fourth day the horse went back to work perfectly well, and has remained so ever since, now just on two years ago.

I send you a photograph of the calculus enlarged to the exact size of the original. It was mulberry shaped, and of the usual phosphatic character. It weighed 3 oz. 5 drs., and measured—long diameter $2\frac{1}{2}$ inches, short diameter $2\frac{1}{8}$ inches, longest circumference $6\frac{1}{2}$ inches, and shortest circumference $5\frac{5}{8}$ inches.

A CASE OF SCIRRHOUS CORD.

BY VET. LIEUT. R. ST. C. HOUSTON, ARMY VET. DEPT., MADRAS.

THE subject was a country bred pony, six years old, 12 hands high, which had been bought at Delhi during the Durbar. As the animal was "bobbery" he had been castrated by a subordinate about a month before I was asked to see him.

I found the pony down in his box, stretched out. He was raised with difficulty, and presented a tucked-up appearance, being scarcely able to move, more especially his off hind. On examination a large scrotal swelling was evident, the right cord being tumefied and discharging from the unhealed operation wound—the left wound had healed up. Although the animal was in a weak state, and had only been kept alive by daily

administration of brandy, milk, eggs, &c., I decided to operate. His temperature was 103° F., pulse rapid and weak, respiration rather hurried.

The animal was cast and anæstheticised in the usual manner, and the scrotum disinfected. I then dissected back the skin and cicatricial tissue from the end of the cord, and about two-thirds of the distance towards the inguinal ring. I found the end of the cord a fibro-vascular mass—the cord itself being much swollen and surrounded by tissue for almost the whole way towards the inguinal ring. This tissue I removed with the knife, hæmorrhage being controlled by pledgets of cotton wool soaked in perchloride of iron, and the larger vessels being ligatured. The tumour at the end of the cord I removed by actual cautery. The wound was packed with antiseptic cotton wool, and the lips sutured, care being taken to leave ample space for drainage. The animal was allowed up, nourishing diet prescribed, and pot. iodide ʒii. per day administered. In five days the sutures and cotton wool were removed, and the wound treated in the usual antiseptic manner. The animal made an uninterrupted recovery.

My object in bringing this case to notice is not its rarity, or any peculiarity in the treatment, but because I think it shows the efficacy of early surgical interference in such cases.

STRONGYLOSIS OF THE ABOMASUM.

BY W. HEPBURN, JUN., M.R.C.V.S., COLDSTREAM, N.B.

In June last I was called in to see some sheep which were scouring badly, and rapidly loosing flesh.

On seeing the sheep, I found them greatly emaciated, anæmic, the wool dry to the feel and easily pulled out; the fæces were dark in colour and pultaceous. The owner mentioned that he had had similar cases in previous years, but this year there were more than ever.

One of the affected sheep was killed, and an immediate post-mortem made; all the organs were apparently healthy, with the exception of the liver and abomasum. The liver was lighter in colour than normal, was easily broken down on pressure, and on microscopic examination, showed advanced signs of fatty degeneration.

The wall of the abomasum showed slight inflammatory signs, and on scrapings being examined, numerous nematode worms were found belonging to two species, viz.:—*Strongylus contortus* and *Strongylus filicollis*. The identity of the latter worm was established by Professor Taylor.

As a rule it only occurs in the small intestines, but in this case they were more numerous in the abomasum than in the part of the duodenum examined; and moreover, they were more numerous there, than the specimen of contortus.

Treatment adopted.—The affected sheep received a liberal allowance of salt in their food, and daily doses of 3 oz. of a one per cent. solution of creosote. Up to the present (September) one has died, and the rest are progressing satisfactorily.

VOLVULUS IN A PATIENT ON WHICH OVARIOTOMY HAD PREVIOUSLY BEEN PERFORMED.

BY VETY.-MAJOR J. A. MEREDITH, IST LIFE GUARDS.

History.—Troop mare, Army No. 57,507, 1st Life Guards, been in the regimenr three and a half years, and was nine years of age. Since joining had been somewhat vicious, more so during œstrum, when it was found impossible to work her in the ranks, because she would stop and kick, upsetting all movements, spurs making no difference. She was dangerous in the stable also. We decided that ovariotomy might effect relief, although sodii salicylus when administered had a quieting effect. On June 16th, 1903, my friend Professor Hobday, F.R.C.V.S., kindly consented to operate for me with his own instruments, having found mine unreliable. The operation was successful, so much so that the mare was ridden in the ranks, in ten days going quietly, and only showing slight attempts to kick. She was kept under observation for another week, and since that has done regular duty, and become a useful animal, attaining a better condition. The left ovary was found diseased, and enlarged about twice the usual size; nothing much was noticed with the right organ. The mare continued to do well until July 16, 1903, when a slight attack of abdominal pain was reported, which did not continue long, and was easily relieved. On August 18th, 1903, at 9 P.M., the mare again showed abdominal trouble; relief was effected in half an hour, the patient remaining satisfactory until 9.30 A.M., August 19, the only treatment offered in the first instance being carb. amon. and pub. zinzib. embolus with cold water enemas. Water and a small mash was taken at 6 A.M. readily. On the return of the pains at the above-mentioned time the symptoms were quite different; the patient was very violent, and the attack continuous, nothing preventing her rolling and remaining on her back.

Examination per rectum denoted an obstruction, and the pains could not be connected with the previous operation.

Much treatment and nursing were tried, with no abatement of the pains, the mare eventually dying at 4 A.M. on the 20th August.

Post-mortem.—A volvulus of the small intestines, somewhat like a double knot, which we could not unfasten when removed from the carcase. The operation of ovariatomy had no part in causing the disease, and although performed so recently, only the slightest trace of the removal of both ovaries existed. The question arises to me—Was the volvulus caused by the kicking habits of the mare, or took place during the rolling of the mare? We could trace no adhesions to suggest that the volvulus had existed some time.

DISLOCATION OF THE KNEE.

BY VET.-CAPT. H. B. KNIGHT, A.V.D., NORWICH.

THE patient, a country trooper six years old, when in the riding-school on May 22nd, refused to jump a bar. She was made go at it by a rough-rider, but hit it with the left knee with considerable force, falling on the landing side. She got up and moved on three legs for about 20 yards.

I saw her shortly after the accident, when she was standing on three

legs in acute pain and sweating profusely. The knee-joint was "cupped" or hollowed and distorted outwards, giving the limb a "horn-legged" appearance, and on manipulation of the part crepitus was detected. As the case was hopeless it was at once destroyed.

On examination of the part it was found that both rows of small bones of the joint were dislocated backwards, and several small pieces chipped off the upper row. There was a comminuted fracture (eight pieces) of the radius.

Translations and Extracts.

CATTLE PLAGUE IN EGYPT.

THE latest news from the Delta Provinces shows that the cattle plague is slowly but steadily spreading over the Delta, and cases have occurred in the Fayoum and in the districts south of Cairo. Large supplies of serum have been received, and the inoculation of animals is being continued in all the districts in which cases of rinderpest have been reported. Sir Horace Pinching reports that the Fellaheen have shown themselves, as a general rule, to be very ready to submit their cattle to inoculation, and the cases of concealment of the disease have not apparently been frequent. Unfortunately, some of the serum supplied from Constantinople appears to have been almost useless. At Kharaba, near Aboukir, for instance, several animals were inoculated first with the blood of an infected beast, and afterwards with the Constantinople serum, with the result that most of them developed bovine typhus in its acutest form. In some cases it has been found that larger doses of this weakened serum have the required prophylactic effect, but reports from certain localities in the Behera Province state that some of the Turkish serum is quite useless, and that over 50 per cent. of animals inoculated have died.

HOPEFUL STATEMENTS.

As to the future, while certain authorities fear a gradual extension of the plague throughout Lower Egypt, and the consequent destruction of the cattle of the country, others assert that the disease, instead of killing off 90 per cent. and more of the cattle in any given district as in 1885, only destroys a proportion of from 20 to 30 per cent., and then leaves the locality. This contention appears to be borne out by some statistics of losses in different markazes, though the vigour with which the sanitary authorities have inoculated the beasts in the infected areas may well account for the diminished mortality. The students of the veterinary schools have shown marked zeal, and the village barbers are being taught how to inoculate cattle, and they may be of considerable use in supplementing the efforts of the hard-worked veterinary service. The Fellaheen of certain districts, who were much alarmed by the unexpected effects of the Constantinople serum, have been quieted by the promise of compensation for all cattle which have died after inoculation, but the authorities have wisely decided not to pay them the full value of the animals at once, otherwise they would buy fresh stock immediately and quarter them in recently infected cowhouses and shelters. A certain amount of serum has been prepared in the country, and more will shortly be forthcoming, and

to obviate the possibility of further disasters the use of the Constantinople serum will be discontinued in favour of the Australian, Cape, and Egyptian lymph, which have given excellent results. As to the prospects of checking the plague, I am inclined to think that the absence of large herds of cattle in the greater part of the country will, with the system of inoculation, prevent the disease from causing anything like the losses of 1885, even if they fail to suppress it for a considerable time. Egypt is still to a great extent the country of small proprietors, and the huge herds of stock seen in Australia and Cape Colony are unknown here.

(*Morning Post*, August 4th, 1903.)

SHEEP SCAB IN THE UNITED STATES.

THE difficulties of dealing effectively with sheep scab in the United Kingdom are sufficiently great to impart an interest to work of the same kind as carried on in the United States. During the year 1901 flocks were inspected on behalf of the Bureau of Animal Industry at Washington embracing in all 10,103,806 sheep. Of these, flocks containing a total of 9,345,289 sheep were reported as free from scab, whilst flocks aggregating 758,517 sheep were reported as infected. The total number of sheep dipped in 1901 was 886,645, as compared with 934,431 in the preceding year, thus showing a decrease of 47,786 animals treated. The largest number dipped in any one State was 284,261 in Illinois, followed by 168,225 in Nebraska, and 96,145 in Nevada. It is worthy of note that in 1900 South Omaha received scabby flocks aggregating 52,026 head, Kansas City 49,089 head, and Chicago 38,573 head, making for these three stockyards a total of 139,688 scabby sheep dipped. In 1901 the figures fell to 9712 for South Omaha, 6664 for Kansas City, and 391 for Chicago, making for the three yards a total of only 16,767, as compared with 139,668 in the previous year. These figures are regarded as very significant, for they show how effective the system has been in preventing the extensive shipment of scabby sheep and thus lessening the danger of the spread of scab by railway trains. The same three dips were used in 1901 as in 1900. Of 506,937 sheep dipped at ten regular stations, 260,002, or 51·2 per cent., were treated with nicotine and sulphur; 176,477, or 34·8 per cent., with tobacco and sulphur; and 70,458, or 13·9 per cent., with lime and sulphur. As to the comparative effects of single and repeated dipping, it was found that a single dipping produced the desired result in flocks aggregating 326,967 sheep, but failed in flocks embracing 29,392 sheep, these numbers representing 91·8 and 8·2 per cent. respectively. In 1901, as in 1900, the effectiveness of the three dips was found to vary at different stations. Kansas City, however, is the only station for which there are reports upon all three dips. In 1901 this station reported 100 per cent. of effectiveness for both the nicotine and sulphur dip and the tobacco and sulphur dip, with 84 to 96 per cent. effectiveness for the lime and sulphur dip. These results are so far superior to those of the preceding year as to support the contention that it is fully as necessary to use a dip properly as it is to determine upon what dip shall be used. As to which is, on the whole, the best of the three dips, we must accept the statement of the bureau that

these dips have proved to be equally effective in a large number of cases, and that no preference can be given to any of the mixtures. The inclusion of sulphur in the dip has the effect of placing in the wool a material which will not evaporate quickly, but will remain there for a period of time longer than that during which the scab parasites usually remain alive away from their hosts; sheep are thus protected against reinfection. Concerning the lime and sulphur dip, which is more likely to be used in Great Britain than the tobacco dips, the opinion is expressed that, when properly made and properly used, the first named dip is second to none as a scab eradicator. There is always some injury to the wool resulting from the use of lime and sulphur dips, though this is very slight in the case of shorn sheep. On long wool the injury is greater and seems to vary with different wools, being more marked on a fine than on a coarse wool. The injury takes the form mainly of a change in the microscopic structure of the fibre, caused by the caustic action of the ooze. When improperly made and improperly used the lime and sulphur dips are both injurious and dangerous, and in such cases the cheapness of the ingredients does not warrant their employment. Where it is desired to eradicate scab from a flock, the flock-master cannot make choice of a dip that will bring about a more thorough cure than will lime and sulphur—of course, properly made and properly used—although it is quite possible for the farmer to find several other dips which will, when properly used, be nearly or equally as effectual as any lime and sulphur dip. There is, however, no dip to which some objection cannot be raised.

(*Times*, 22nd June 1903.)

UNDER the above heading we noticed on June 22nd last some of the results of the work against sheep scab carried out by the Bureau of Animal Industry, a branch of the United States Department of Agriculture at Washington. The official view of these results was decidedly optimistic. In a letter we have received from Dr. Henry Stewart, V.S., of Highlands, Macon County, North Carolina, U.S.A., he combats this position, and says that the actual facts, well-known to all engaged in the industry, tend to controvert the official statistics, and forbid the hope that scab can ever be eradicated under present regulations. He has no hesitation in saying, from a wide acquaintance with the subject, that so far no appreciable impression has been made upon the disease by any official regulations that have been put in force during the past ten or twelve years. Dr. Stewart is the author of "The Shepherds' Manual" and "The Domestic Sheep," and as his letter possesses considerable interest for British flockmasters we give the salient paragraphs. The "Royal Commission" referred to at the end of the letter is presumably the Departmental Committee on the Dipping of Sheep appointed by our Board of Agriculture a few months ago :—

"Sheep scab is rampant throughout our Western States, as I have reason to know personally, as well as from the reports of the chief inspector for the region west of the Mississippi River, who recently stated that 75 per cent. of all the sheep in the State of Wyoming were diseased. Such is also the present condition prevailing in most of the other Western States. The optimistic figures of the Bureau of Animal Industry, quoted in your article, do not in any sense reflect the actual conditions existing. The dippings at the various live-stock yards, carried out under Government control, are

as much, or more, calculated to spread the disease as they are to cure it. The truth of this assertion is sufficiently borne out by the following report of the assistant State veterinarian for Indiana, in which he says:—'This department has been making a special effort to trace the origin of all cases of scab reported from this State, and from the findings conclude that the Government regulations are not effective. Of the last 4506 cases of scabby sheep, it has been found that 4161 had previously come from the stock yards, or had fed with sheep that had come from the yards. This leaves only 345 cases of scab reported as coming from the farms. The loss upon the 4161 sheep was greater than all the profits upon all those sheep purchased for feeding purposes that did not develop disease. Besides, this large number gives us a reputation of having this disease that is not deserved. Greater security can be secured by dipping on the farms, but our advice is to let the sheep alone.'

"The explanation is clear. The sheep are dipped once at the stock yards, assumed to be clean, and are then shipped away to farms, where, of course, the disease soon breaks out, the purchasers of the sheep innocently believing them to be clean at the time of purchase. A single dipping never has, and never can possibly, and never will, cure the scab. The most bitter complaints have come from the various stock yards of the utter worthlessness of the dippings done there. Any expert shepherd will easily perceive the reason why this should and must be. I could furnish most ample proof of this if it were not for fear that I might occupy too much of your valuable space.

"Our Bureau of Animal Industry has made two fatal mistakes, against which your authorities should be on their guard. The first is the undertaking of the Government itself to cure scab with particular dips, to which sheepmen have, to a considerable extent, serious and deep-rooted objection; and the second is in the delusion that scab can be eradicated by the very ineffective—necessarily so—official dippings at the stock yards.

"The enforcement by law of the unpopular compounds mentioned has called forth a strong resentment on the part of owners of sheep, who know, from actual personal experience, that there are other preparations which are equally effective and which are free from the objections, which experience has shown to be well founded, against lime and sulphur, which, as all concerned know, have a distressing effect on the sheep and the fleece as well.

"It is obvious that no scheme to eradicate sheep scab can ever be popular or successful which does not enlist the active and sympathetic co-operation of the owners of the sheep. The only proper place to treat the sheep for the cure of scab is at home, on the range or farm; and sheep should not be allowed to be sent to market unless they are known, and duly declared, to be clear of diseases. The common impression in this country is now decidedly that until our Government change the present regulations scab will continue, and, indeed, increase its present destructive course.

"The unquestionable fact, well known to all concerned, that there has been no diminution, but rather an increase, of this destructive and costly disease of sheep during the past ten years, in which Government regulations have been in force, fully proves the inefficiency of the present methods employed in efforts to control, if not to eradicate it; and for this reason I trust that the members of your Royal Commission will not regard, or be

deceived by, the declarations of our Bureau of Animal Industry; but by going beyond these get to the bottom of the matter and learn the exact facts."

(*Times*, August 31st, 1903.)

TREATMENT OF SHEEP SCAB.

A large number of experiments have lately been made in Germany regarding the treatment of scab, and dips composed of arsenic, tobacco, and cresyle are what are officially recommended.

A. For arsenical dips the following formulæ have been recommended :—

Eberhard's Dip.

Arsenious acid,	25 parts.
Alum,	200 ,,
Water,	3000 ,,

Mathieu's Dip.

Arsenious acid,	10 parts.
Alum,	100 ,,
Water,	1000 ,,

Fowler's Dip.

Arsenious acid,	10 parts.
Potash,	10 ,,
Water,	1000 ,,

Viborg's Dip.

Arsenious acid,	10 parts.
Potash,	10 ,,
Vinegar,	1000 ,,
Water,	1000 ,,

To avoid danger of absorption the sheep should not be dipped for eight to fourteen days after clipping. They should be dipped twice and well scrubbed.

B. Tobacco dip is made by infusing 7·500 kilos of tobacco in 50 litres of water, boiling for half an hour. The liquid is strained through a cloth: 1 kilo each of liquid carbolic acid and potash added, and the dip made up with water to 250 litres. The bath should be at a temperature of 38° Cent., the sheep kept in it for about two minutes, and carefully brushed and scrubbed.

C. Cresyle baths are highly recommended, and seem to be preferred by German practitioners, creoline, cresyl, and lysol being used.

The strength of the solution is 2 to 2½ per cent., and the temperature 36 to 38° Cent. The sheep is kept three minutes in the bath, and well scrubbed all over the body, especially in the neighbourhood of the raw parts, the crusts and scabs being loosened. He is again dipped, care

being taken to avoid any of the bath being swallowed, and the process repeated in a week.

This bath is much more efficacious if a few days before dipping the raw parts are dressed with the following:—

Cresyle or creoline,	. .	1 part.
Alcohol,	. . . .	1 „
Soap,	. . . .	8 „

Folds and horns should be disinfected, as it has been proved that the parasite can live for four weeks in such places, and it is advisable to consider pasturage contaminated for six weeks to two months.

(*Revue Générale de Médecine Vétérinaire*, June 1st, 1903.)

USE OF MOLASSES IN FEEDING THE DOMESTIC ANIMALS.

BEETROOT molasses is what is used in Belgium, and the valuable constituent is the saccharine, of which it contains from 46 to 49 per cent. It also contains 8 to 12 per cent. of mineral matter (salts of potash and soda, malates, tartarates, and citrates of potash and soda), which in small quantities are useful, but diuretic and purgative in large. In some samples others that are noxious exist, such as salts of barium and strontium, formed in the process of manufacture.

The presence of sulphate of soda and nitrate of potash in too large quantities produces a greater or lesser effect on the kidneys and intestines, and they should be looked on as condiments, the effects of which should guide the farmer as to the amount of molasses to be given.

Now-a-days no one will dispute the value of molasses as a food, and indeed it has been so prepared as to enable it to be carried long distances, as in its crude state, "molasse verte," it has only been available for persons living in the neighbourhood of the factory. These various preparations are composed of molasses with an accipient of a greater or lesser nutritive value, as, for example, molassine, containing 80 to 84 per cent. molasses, equal to 39 to 40 per cent. pure sugar, and 15 to 20 per cent. peat moss.

Professor Dechambre gives the following tables of equivalents, and the saving per head per diem:—

1. Horses—Hay, 6 kilogrammes.
   Oats, 3·500 „
   Molassine, 3 „

   Instead of—
   Hay, 6 kilogrammes.
   Oats, 7·500 „
   Bran, 1·500 „

Making a saving of 75 centimes per diem.

2. Hay, 6 kilogrammes.
   Molasses and ground nuts, 4·900 „
   Oats, 3·500 „
3. Chopped straw, 3 to 4 „
   Molassine, 2 „
   Maize, oats, and beans, 7·500 „

4. Chopped straw,	6	„
Bran,	6	„
Water,	6	litres.
Crude molasses,	1·500	kilogrammes.
Chaff,	6	„

The three last are often used in lieu of hay, bran, oats, and straw for heavy cart horses, and a saving of 80 centimes per diem effected.

The molasses is dissolved in water, and then sprinkled over the chopped straw, which it is mixed with well; the bran is added, and the whole mixed a second time.

For cattle the following is recommended:—

Chopped straw,	5	kilogrammes.
Bran,	5	„
Crude molasses,	1·500	„
Water,	6	litres.
Beetroot,	10	kilogrammes.
Oat straw,	5	„

For working oxen 850 kilogrammes in weight—

Molasses and straw,	7	kilogrammes.
Buckwheat,	2	„
Beetroot,	20	„
Wheat chaff,	2	„

For milch cows about 500 kilogrammes in weight—

Molasses and straw,	500	grammes.
Beetroot,	2	kilogrammes.
Chaff,	200	grammes.
Buckwheat,	200	„

For sheep, about 50 kilogrammes in weight.

These formulæ will of course vary with the weight and appetite of the animal, and also with its power of assimilation.

The maximum quantity of molasses that should be given in the twenty-four hours is—

Large ruminants,	4 to 5	kilogrammes.
Small,	400 to 500	grammes.
Large draft horses,	2·500 to 3	kilogrammes.
Light horses,	1 to 2	„

The point to be remembered is to stop the molasses if polyuria or diarrhœa sets in, especially the latter.

(*Le Bullétin Vétérinaire*, April 15, 1903.)

THE LIVERPOOL SCHOOL OF TROPICAL MEDICINE.

REUTER'S Agency states that Sir Alfred Jones, Chairman of the Liverpool School of Tropical Medicine, has received the following communication from the expedition sent by the School to the Gambia and Senegambia to investigate the newly discovered parasite of trypanosoma. The report is dated March 18, and comes from M'Carthy Island, 150 miles in the interior of the Gambia. The communication says:—

"We have just returned from a trip, taking nearly two weeks, to Maka, the chief town of the French 'Cercle de Niani-Ouli.' While there we stayed with M. Porthes, the French Commandant of that district, who was very kind to us in every way. Maka is situated about 16 miles from the head of Kunchau Creek, and about twice that distance from the main river. Our object in going there was to examine the natives living in the interior and away from large collections of water. Although we found the parasite in none of the natives examined, we did find a trypanosome in each of two horses belonging to the Commandant, which he believes to have become infected while in the district far up the river beyond the British possessions. We are hoping that there is something in this, and intend to experiment at St. Louis (French territory), as many horses there are said to suffer from a species of 'malaria' and die from it. We hope to be able to show that it is trypanosoma, the symptoms, as far as we can see at present, being the same as those developed in the two horses seen at Maka. This will be of great importance to the French Government in Senegal if correct. If it is at all possible Dr. Tod intends leaving for this district within the next two days. At present we intend to leave the Gambia by the 'Benin,' which is due at Bathurst on the 7th of next month. From Dakar we shall go straight to St. Louis, where, unless something important turns up, we shall only stay for a fortnight before returning to Dakar to catch the steamer for Conakry. We recently infected a horse with the human trypanosome. Only two days ago we found numerous trypanosomes in its blood, and in the stomach of a species of horn-fly (which is rather troublesome here) which had fed on this horse we found interesting forms of the parasites, suggesting conjugation. It is possible, therefore, that this series of observations may keep us in this colony for a fortnight longer than we expect. We have lately sent a short account of our work in M'Carthy Island to Sir George Denton, who seemed to be rather pleased with it, since he has sent a copy of our letter to the Secretary of State."

Another communication from the expedition spoke very highly of the attention shown them by the French Commandant at Maka, and a letter has been sent to the French Colonial Office asking them to convey to M. Porthes the thanks of the School for his valuable assistance.

(*The Times.*)

TO OUR READERS.

Being fully aware that a thorough knowledge of all the diseases of Mammary Glands is of vital importance to human beings, we have obtained the plates and copyright of this admirable work, and Veterinary-Lieut.-Colonel Nunn has kindly undertaken its translation into English. We published the first portion in June 1902, and shall continue to publish it in monthly parts, and afterwards in book form.

DISEASES OF THE MAMMARY GLAND.

BY P. LEBLANC, LYONS VETERINARY COLLEGE—TRANSLATED BY VET.-LIEUT.-COLONEL NUNN, A.V.D., F.R.C.V.S., ETC.

(*Continued from page* 143.)

M. Nocard has reproduced the disease experimentally. He says, "If a small quantity of virulent tubercle culture is injected into the udder of a milking cow or goat, tubercular mastitis is induced, which progresses so rapidly as to cause death in a few weeks. In such experiments mastitis appeared in from six to thirteen days with a persistent temperature of 104° to 105° F. up to a short time before death. Post-mortem examination showed that the mammæ and mammary ganglia were affected.[1]

Pathological Anatomy.—The whole udder is enlarged, hard, and resistant to the knife, whereas if healthy it is elastic on section. The cut section has a peculiar appearance, the lobules being very distinct and separated from each other by thick infiltrated and injected bands of connective tissue, the red colour of which is most marked. The lobules themselves vary in colour, from a yellowish grey to red, and the large vessels are embedded in the connective tissue. This gives a section of the gland a mottled appearance. The membrane lining the sinus is dull and rough, and has a number of small tubercles growing from it.

In the sow the gland is fibrous, hard, and smaller than in health. It is surrounded by a thick fibrous capsule that sends septa into its substance, dividing the lobules.[2]

Fiorentini saw four cases of miliary tuberculosis in the mammæ of cows. Möbius recalls one of primary infection, all the other organs being healthy.[3]

Fiorentini remarks that the lesions commence in the insterstitial tissue at the periphery of the gland and advance to the centre.

The acini and minute canals remain visible, but there is an infiltration of leucocytes into the lobule. In cases of old standing the lobules, although retaining their form, become uniform, granular,

[1] Nocard. Experimental tubercular mammitis in milking cows and goats. Recueil de méd. vét. 1900, page 721.

[2] Primary mammary tuberculosis in the sow has been recorded by Van Harrevelt. Tidsch. voor. Veartse, 1899.

[3] Möbius. Primary mammary tuberculosis in the cow. Jahresb. Schütz und Ellenberger, 1895, page 52.

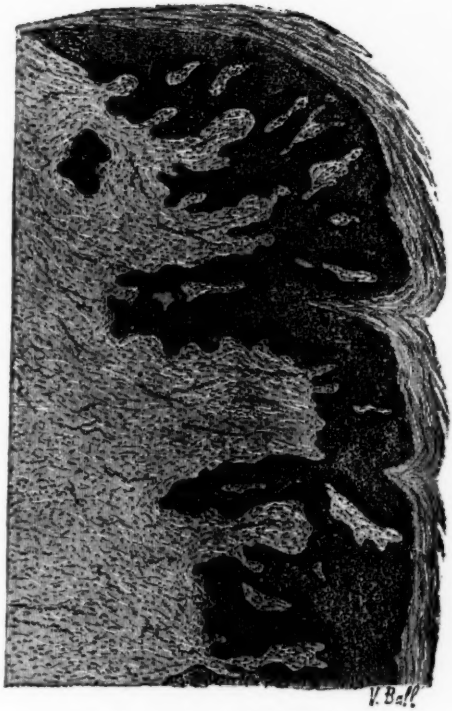


FIG. 23.—Globular papillomata (cow).

FIG. 24.—Filiform papillomata (cow).

the acini disappear, the canals can no longer be distinguished, and in certain cases contain giant cells.

Dubor, Orthmann, and Piscascek consider that these cells form in the acini at the expense of the epithelium. Sabrazes and Brissaud do not agree; they are of opinion that they are not true giant cells, but that their origin is mesodermic.

In the galactopherous canals the earlier lesions are peripheric infiltration, that at certain points are so abundant as to form small nodules that gradually protrude into the lumen of the canal, destroying its lining membrane. Tuberculous follicles form in the connective tissue, also vegetations in the arteries, which may completely obstruct the vessel.—(Delbet.)

Kolesnikow noticed catarrhal inflammation in the lactiferous canals as well as chronic interstitial lesions. Sections show hyperplasia of the interstitial tissue with well-marked chronic interstitial mastitis, and scattered through the interlobular connective tissue giant cells.—(M'Fadyean.)[1]

In some of the lobules the excretory canals are obliterated, in others they are dilated and filled with round cells.

Some of the acini are atrophied, others dilated and choked up with cells in process of undergoing fatty degeneration, so that under the microscope the nodules look like adipose tissue. In many places both blood and lymphatic vessels are obliterated.[2]

Diagnosis.—For a long time the true nature of tubercular mastitis remained unrecognised. The persistence of subacute inflammation, the gradual increase in the size of the gland, its peculiar hardness, and progressive loss of condition, are all manifestations. The lymphatic glands that are accessible should be always examined, also the respiratory organs, by auscultation and small pieces of the gland, for which purpose M. Nocard advises the harpoon trocar of Duchenne, of Boulogne. This instrument is one-sixteenth of an inch in diameter and is plunged into the hard part of the udder, bringing a small portion of tissue back with it.[3]

This plan has been largely used in Germany by Ostertag and Knuth, of Berlin.[4]

Prognosis.—The prognosis is bad. Primarily it acts as a point of departure for organic intoxication. Secondly, it is accompanied by generalised lesions, which of themselves will cause death by cachexia.—(Nocard.)

Prophylaxis.—The matter of sanitary police is not within the scope of this work, and we will not enter into a discussion as to whether the milk of a tubercular cow that shows no local lesion is dangerous or not; all we will say is that in most civilised countries precautions are taken, particularly in France and Denmark.

[1] M'Fadyean. Tubercular mastitis in the cow. The Journal of Comp. Pathol. and Therapeutics, vol ii., 1889, page 119.

[2] Kolesnikow. Archiv de Virchow, vol. 674, page 531.

[3] Nocard. Tuberculous mastitis. Société centrale, 30th Dec. 1896.

[4] Knuth. Ein Beitrag zur Fertstellung der Eutertuberculose und der Frage der virulenz der Milch eutertuberculöser. Zeitsch. f. Fleisch und Milch, 1900, page 168.

It is prudent to boil milk from unknown sources, as the bacillus resists a temperature below 203° F.

PARASITES IN THE MAMMARY GLAND.

The only case reported that we can find is one of an echinococcus by Rehmet.

MAMMARY TUMOURS.

BY MM. V. BALL AND P. LEBLANC.

WE have divided the tumours of the mammary gland into three classes :—

1. Benign. Those that are clearly defined, localised in the gland, and not connected with neighbouring tissues or glands, and which do not recur.
2. Malignant. Those that are not clearly defined, that encroach on the neighbouring tissues and glands, and are likely to recur after operation.
3. Sarcomata. Those that are intermediary between benign and malignant; at the commencement, resembling the former but terminating in the latter.

The origin of benign mammary tumours in the human being is disputed. Cruveilhier, Reinhart, Virchow, Cornil, and Ranvier consider that they arise from the connective tissue; Lebert, Broca, and Verneuil that they have a glandular origin. The reason of this difference of opinion is that such tumours are seldom formed of one tissue only.

The connective tissue theory is unsatisfactory, as it does not explain the almost constant presence of *culs de sac*, the number of glandular elements in the interior of the tumour, or the formation of cysts.

Delbet considers that the majority of benign mammary tumours are of glandular origin and should be classed as adenoma. He considers, "and we think with reason," that they are not strictly neoplasms but inflammatory products.

Malignant tumours or cancer are not uncommon, especially in the bitch, in which animal, as well as the mare, carcinoma and epithelioma are known. The former can be considered as a variety of the latter, as they are really only infiltrated epithelioma.

Most pathologists consider that the latter is of glandular origin, which view, however, is disputed by Virchow, but it has been pretty well acknowledged that the carcinomata are epithelial.

The theory of inflammation as regards benign tumours has been held by Virchow and Kœnig, the former of whom has said regarding fibromata of the mammæ,—"In the commencement there is interstitial mastitis, which involves the lobules of the gland and extends to the canals." The opponents of this theory put forward

that such tumours in the human being are encapsuled and moveable, whereas in the bitch, with those known as adeno-fibromata, this is not the case, although no doubt they are the result of an attack of mastitis that has become chronic.

Such growths are usually seen in the posterior glands of old bitches that are subject to injuries, and while in milk are liable to be overlooked. They vary in size up to that of a man's fist, and do not invade the surrounding tissues, remaining for a long time of their original size, which is not the case with a true neoplasm.

When divided in certain parts there is an excess of connective tissue, in others numerous cysts due to destruction of the conjunctival walls separating the acini.

When the adeno-fibromata of the bitch is compared with chronic mastitis of the cow the numerous points of resemblance are very striking. In both there is hyperplasia of the connective tissue, dilatation of certain groups of acini, and the presence of cysts.

In studying the adeno-fibromata one can come to the conclusion that although in some essentials they resemble this adenomata, that they in reality differ greatly, and that what would be classed as such from a classical point of view would, to a pathologist, be a neoplasm, chiefly composed of connective tissue, which has obliterated the acini.

I have given a number of drawings of these growths which may be of interest, but it should be remembered that the greater the amount of inflammation the greater the extent to which the mammæ is disfigured.

Diagnosis.[1]—In the earlier stages mammary tumours are seldom noticed. They frequently grow to a considerable size, but it is not usually easy to determine their precise nature. From a clinical point of view we have classified them into benign and malignant. The first are seldom very large and have no tendency to spread. They are confined to the gland itself and are moveable under the skin; furthermore, the neighbouring glands are not affected. The adeno-fibromata, fibromata, lipomata, chondromata, and myxomata are all classified in this group; the epitheliomata, carcinomata, and sarcomata, which are the three varieties clinically termed cancer, constitute the latter.

These are, as a rule, readily recognised, having a large base with diffused edges, a tendency to spread, sometimes involving the whole gland, and the neighbouring lymphatics are almost invariably involved.

Prognosis.—The prognosis of a tumour depends on its nature and development, cancer being exceedingly grave from its tendency to spread, whereas the others are nothing like as dangerous.

The gravity of a tumour depends on the degree to which it is capable of developing.

This is dangerous, as they may become so large as to impede

[1] The deductions arrived at are entirely based on observations made on the bitch.

locomotion, cause deformity, emaciation, and septicæmia. By injuries, such as bruises against the ground, ulcers may form which are very difficult to heal.

Treatment.—It is not always advisable to remove a benign tumour of small volume. If they are large they are liable to injury and become ulcerated, or subject to interstitial hæmorrhage and hæmatoma, which may altogether alter them, and in any event cause them to become an excellent culture medium for pathogenic organisms.

I. *Benign Tumours.*—The animal is placed on her back, the hair shaved off the part, the skin disinfected, and an incision made either from without inwards or within outwards of the median line according to the case, which is frequently sufficient to allow the growth to be enucleated without any hæmorrhage. A suture or two in the skin wound and a pledget of cotton wool with any antiseptic will complete the operation.

The skin should be preserved as much as possible where it is healthy so that there should be no gaping of the lips of the wound, and, if necessary, the vessels in front and behind the gland should be ligatured.

II. *Malignant Tumours.*—The operation is the same as for benign, but is usually more difficult on account of the line of demarcation between the neoplasm and the normal tissue being ill defined, thus rendering it necessary to remove a considerable portion of other structures with the diseased gland. This precaution should never be neglected, especially if there is reason to believe any of the neighbouring glands are involved.

Even if this is done, it is not unusual to see the tumour spread and cause death. This usually happens when the structure is not entirely removed, and the other mammæ are centres for the growth, or when the neighbouring lymphatics are involved.

Classification.

From a clinical point of view mammary tumours may be classified as follows :—

I. Cutaneous vegetations,	Papillomata of the cow.
II. Benign tumours—connective tissue,	Adeno-fibromata and the various varieties. Fibromata. Lipomata. Myxomata. Chondromata.
III. Malignant tumours (cancer)—epithelial,	Epitheliomata. Carcinomata.
conjunctival,	Sarcomata.

THE COW—MAMMARY CUTANEOUS VEGETATIONS.

These lesions are commonly known as warts or papillomata, and are not tumours in the true sense of the word, but inflammatory lesions of the skin, not of the mammæ alone, but may be seen over the whole body. The elements of these neo-formations show that they are caused by hypertrophy and multiplication of the papillæ of the dermis. Papillomata are seen on the mucous membranes, and, as a rule, such originate from irritation, but also from microbian infection, but when mammary they are always the result of inflammation. They often disappear spontaneously and do not usually recur after surgical interference.

There is a popular belief that papillomata are contagious and that one will give rise to others. Certain facts in both human and comparative pathology give colour to this belief.

Dr. Aubert mentions a remarkable case in *Lyons Medical*.[1]

Bedel, in the *Bulletin de la Société des Sciences Vétérinaires de Lyons*, mentions a case somewhat the same as Dr. Aubert. Having operated on a heifer whose udder was covered with warts he accidentally wounded the left index finger, and two weeks after three small warts the size of a grain of wheat formed on the cicatrices.[2]

These and other cases appear to show that papillomata can be transmitted from the cow to man.

The observations of Majocchi on the microbian nature of these growths permits of an argument in favour of their contagious nature, and in an article published by him in the *Clinica Veterinaria*, August and September 1881, he states that he considers warts in men and animals are contagious from one species to another, and *vice versa*, and, basing their theory on this fact, several observers have endeavoured to detect a specific organism.

We have found in warts from a cow a bacillus, resembling that described by Majocchi with others, but we have not been able to prove that it is specific, and although we have frequently tried various methods of inoculation we have failed to get any results. Nevertheless, we quite allow that transmission is possible, in fact cases have come under our observation, that admit of but little doubt.

These growths are sometimes so numerous as to cover the whole gland, which is hidden in them, causing it to be impossible to milk the cow. Kunze[3] has reported a case of a four-year-old cow, in which the whole gland was covered with warts, causing it to resemble a cauliflower, in which the teats were hardly visible.

In almost all cases it is young subjects that are attacked, and when they reach adult age a spontaneous cure takes place, as at this period the nutritive vessels undergo a condition of thrombosis with endarterial granulations which plugs them up, while at the

[1] Lyons médical, 16th Dec. 1900.—Dr. P. Aubert. Warts on the teats of the cow with multiple contagion amongst human beings.

[2] Bedel. Transmission of warts from a heifer to man.—Soc. des sc. vét., 3rd February 1901, page 56.

[3] Kunze. Werzen am Euter einer Kuh. Sachs. Berl., S. 99.

XUM

same time the new-formed material presses on them from without. This cuts off the supply of blood, and the wart dries up and falls off.

The growths are known as horny papillomata, and we have not observed them on the mammæ of any other animals except the cow. Some are globular and large, others elongated or cylindrical and much smaller; both forms may exist together.

I. The first mentioned are seen in small, round, or oval masses, or in flat discs connected to the skin by a short, slender stalk, and are generally separate from each other. They are usually white in colour or of a yellow tinge, the surface being shiny, and covered with epidermic scales that overlap each other.

If they are large the epithelial covering is not continuous with the skin, and in such cases the lower part is grey, softer, and more pliable than the upper. The growth has a firm feeling, and on section an outer yellow layer is seen, the inner border of which is denticulated. The centre of the tumour appears made of a mass of greyish-white fibrous tissue.—(Fig. 23.)

Microscopic Appearances.—The basement is formed of fibrous tissue, that in its earlier stages has somewhat a resemblance to sarcomata. The blood-vessels all run towards the epithelial layer. The largest part of the growth is formed of connective tissue, in the centre of which there is sometimes the débris of atrophied glandular structure. The outer border is denticulated, much resembling a section of the Malpighian layer of the skin.

The epithelial layer is analogous to the epidermis, the cells being stratified and remarkably thick; on its inner surface it is irregular and denticulated, which is well shown in Fig. 23.

In some cases two processes come in contact, and anastomose at one or more points, showing on section spaces occupied by connective tissue.

At the inner surface the cells are large, polyhedral, and united together by intercellular prolongations, which give their edges a crenelated appearance, but as they approach the surface they become flattened, and at the outside they form a horny layer.

II. *Cylindrical Papillomata.*—These are usually seen on the teats, scattered over them more or less abundantly in patches, the upper part in some cases having a velvety look, in others it is rounded and swollen. They are white and hard, but frequently covered with a black crust of dust and dirt. They are seldom over $\frac{3}{8}$-inch long, by $\frac{1}{16}$ to $\frac{1}{8}$ inch wide, and often fifteen to twenty can be found on one teat.—(Fig. 24.)

Microscopic Appearances.—The minute structure much resembles the former. The lower surface of the layer of dermis is much denticulated, the Malpighian papillæ dividing it up, and being split into numerous branches, much more so than in the previous form. The outer border on section is in one plane, but is broken up into angles that are covered with the horny layer that is

particularly thick at the summit.—(Fig. 24.) These angles or projections are visible to the naked eye, and give the surface of the wart a rough appearance. There are usually new growths taking place in the neighbourhood ef the primary one.

Treatment.—The patients should be isolated, and more especially kept away from any young animals. The warts should be removed. This can often be done by the hand, and the bleeding is insignificant; or if they are large they can be cut off by scissors, or a string or elastic band put round the base to strangulate them, when they will drop off.

Internal medication is useless.

OTHER TUMOURS.

With the exception of those mentioned, other neoplasms on the udder of the cow are rare, in fact a case reported by Resow is the only one that we are aware of. On post-mortem examination, in addition to a number of sub-lumbar growths of variable size, five tumours from the size of a chestnut to a man's clenched fist were found in the posterior quarter on the left side, separated from each other by healthy tissue. The largest was surrounded by a thick capsule adherent to the sinus, the wall of which was partly destroyed. The left lymphatic glands were increased in size, and the greater part of the tumour was composed of round or polygonal cells with one or more nuclei, united together by homogeneus tissue.[1]

Reindl and Kitt mentions osseous tumours in the mammæ of a cow.

MARE.

In the mare as in the cow mammary tumours are not common. Adeno-fibromata are recorded, but, as in the bitch, in all probability they are the result of inflammation. Kitt saw one in a mare that weighed 12 kilogrammes. The skin was intact, but the subcutaneous tissue thick and infiltrated.

Vonnerholm mentions a case of sarcoma that developed cysts and had undergone ossification. The cysts were variable in size, and contained a chocolate-coloured fluid, with crystals of cholesterine and epithelial débris.

Cadiot gives a case in a mare of a mammary tumour invading the neighbouring tissues, on which he operated for fistula. Microscopic examination showed it to be a carcinoma. The account published, however, much resembles one of botryomycosis.[2]

In nineteen cases of mammary tumours that came under his notice Cadiot found one in a mare that resembled epithelioma.[3]

[1] Resow. Zeitschrift. f. Fleisch und Milchlhy., April 1900, pages 132 and 133.
[2] Cadiot. Bull. de la Societe cent., Nov. 1893.
[3] Cadiot. Eléments de pathologie et de clinique. Paris, 1899, page 588.

Legal News.

IMPORTANT "SERVING ON JURY" QUESTION.

HARLESDEN PETTY SESSIONS—24th September 1903.

THE Bench considered the objection of Mr. Philip J. Hagmaier of Kilburn to serve as a juror on the ground that he was a registered medical practitioner within the meaning of 33 and 34 Vict. c. 77. Mr. George Thatcher, the solicitor to the Royal College of Veterinary Surgeons, appeared in support of the objection, and after putting in formal proof of the claimant's status as a member of the Royal College of Veterinary Surgeons, quoted from the original Charter of 1844 a recital of reasons, that, owing to the petitioners not participating in the privileges and exemptions which had been granted to the medical and other professions, much injury had arisen to themselves in the course of their practice, and they being so occupied in the discharge of the duties of their profession, were unable to discharge parochial and other duties enforced on them, and that upon such a prayer a charter had been granted recognising the veterinary art as a profession; that by a further charter of 1876 a register had to be kept of all who were members of such profession; that by the Veterinary Surgeons Act of 1881, sec. 2, veterinary surgery was defined as the art and science of veterinary surgery and medicine, and according to section 17 exclusive rights of practising and being called veterinary surgeons were given, that the words in the Jury Act, so far as regarded England, exempted certain certified medical practitioners, and included registered medical practitioners. He contended that, having regard to the words in the clause, to the charter, and to the fact that all veterinary surgeons had to be on the register, that they therefore came within the words "registered medical practitioners" within the meaning of the exemption clause in the Jury Act. He then said that the point had been settled in Ireland by the Court of Crown Cases Reserved allowing exemptions, though the words of exemption in the Irish Act were "licensed medical practitioners," instead of "registered practitioners."

The Chairman at this point interposed, and said the Bench were not bound by the decision of an Irish Court, in which Mr. Thatcher at once acquiesced, and said that he fully conceded that, but that he thought it might be useful that the Bench should know it by way of a guide. The Chairman, after consulting with the other members of the Bench, stated that the objection was rejected, and that the name must appear on the jury list. Mr. Thatcher then asked for a case. The Chairman—Certainly. We think you are entitled to it.

Review.

THE COMPARATIVE ANATOMY OF THE DOMESTICATED ANIMALS. PART. I.—OSTEOLOGY AND ARTHROLOGY. By J. M'FADYEAN, M.B., M.R.C.V.S., B.Sc.

This little volume is now in its second edition, and its merits are so well known as to hardly need any lengthy notice from us; suffice it to say that we consider it an excellent text-book, and one which all students in the subject should certainly possess. The book is well got up, well printed and bound, and does credit to the publishers, Messrs. W. & A. K. Johnston, Limited, Edinburgh.

ARMY VETERINARY DEPARTMENT.

From *The London Gazette*, Friday, August 28.

War Office, *August* 28.

IMPERIAL YEOMANRY.

Herts.—A. L. Farrant, F.R.C.V.S., to be Vet.-Lieutenant.

INDIAN ARMY DEPARTMENTS.

The following appointments have been made to the Staff in India:—Vet.-Lieut.-Colonel E. H. Hazleton, Army Veterinary Department, to be Inspecting Veterinary Officer, Bombay Command.

Vet.-Captain W. Carr, Army Veterinary Department, has been selected for employment under the Colonial Office in Northern Nigeria, West African Protectorate.

September 8.—Vet.-Lieutenant A. F. Deacon embarked in S.S. "Soudan" from Southampton, for a tour of service in India.

September 11.—Vet.-Captain Axe reports his departure in S.S. "Caledonia" for Bombay, on the termination of his leave from India.

From *The London Gazette*, Friday, September 11.

War Office, Pall Mall, *September* 11.

ARMY VETERINARY DEPARTMENT.

The undermentioned Vet.-Lieutenants to be Vet.-Captains:—J. T. Coley, F.R.C.V.S., W. M. Millar.

From *The London Gazette*, Friday, September 18.

War Office, September 18.

IMPERIAL YEOMANRY.

City of London (Rough Riders).—J. W. Whitecross, F.R.C.V.S., to be Vet.-Lieutenant.

Notes and News.

REMOUNT DEPARTMENT REFORM.—In the third report of the Committee of Public Accounts, which was issued recently, it is pointed out that the Remount Department, which consisted before the war of eight persons employed in purchasing yearly 2500 horses, was only strengthened by the addition during the war of three officers and four clerks. Inasmuch as the expenditure in a single year upon remounts had grown to upwards of £7,000,000, the Committee cannot but regard these additions as entirely inadequate to control such an expenditure, and they strongly recommend the formation of a reserve of officers from the cavalry capable of

undertaking remount duties both at home and abroad should another war necessitate their services.

LECTURES ON BACTERIOLOGY AT PLYMOUTH.—The Plymouth Education Authority has appointed Dr. F. Bushnell to deliver a course of bacteriological lectures for medical men, veterinary surgeons, agriculturists, brewers, farmers, sanitary inspectors, teachers, and others. These will be illustrated by lantern slides, cultures, and demonstrations, and it is hoped to make arrangements for a class of practical bacteriology in the future.

Correspondence.

PASTEUR "BLACKLEGINE.

To the Editors, VETERINARY JOURNAL.

SIRS—Some little time since I read an interesting and valuable communication in the columns of the VETERINARY JOURNAL, by Mr. Inglis, M.R.C.V.S., of Forfar, as to the efficacy of the "Pasteur" Vaccine for the prevention of blackleg, and with the opinion so lucidly expressed by this gentleman I entirely concur.

Since last January I have used ninety doses of the single (cord form) of Blacklegine obtained from the agents, Messrs. C. H. Huish & Company, Red Lion Square, London, in the worst affected districts; and in each case where animals on the farm were already dead or dying, I vaccinated what remained apparently healthy, and in each and every instance the operation secured immunity from attack, and "quarter evil" was seen no more.—Your obedient Servant,

THOS. S. NEWBURY, M.R.C.V.S.

FENNY BRIDGES, OTTERY ST. MARY,
DEVON, *August* 1903.

Communications, Books, Journals, &c., Received.

Agricultural Journal (Cape of Good Hope); Berliner Thierärztliche Wochenschrift; La Clinica Veterinaria (Milan); Deutsche Thierärztliche Wochenschrift; Tannoform in Veterinary Medicine (March); The Sanitary Journal; Scottish Medical and Surgical Journal; Veterinary Record; La Riforma Veterinaria; Le Mois Scientifique (Paris); L'Echo Vétérinaire (Liège); Annales de Médecine Vétérinaire (Brussels); Johns Hopkins Hospital Reports; Journal of Comparative Medicine and Veterinary Archives; Recueil de Médecine Vétérinaire; Gazette Médicale de Paris; Modern Medicine; Johns Hopkins Hospital Bulletin; Il Veterinario di Campagna (Moncalieri); Le Bulletin Vétérinaire (Orleans); Revista de Medicina Veterinaria (Bucarist); La Revista Veterinaria (Buenos Aires); Zeitschrift für Fleisch-und Milchhygiene (Berlin); Buletinul Societatii de Sciinte diu Bucuresci-Romania; The Meat Trades Journal; The Dental Record.